AUG 28 1912

INDEX TO ADVERTISEMENTS 55

Rock Products

DEVOTED TO

Concrete and Manufactured Building Materials

Volume XI. CHICAGO, ILL, JUNE 22, 1912. Number 12.

CAROLINA PORTLAND CEMENT COMPANY

We are the largest distributers of Portland Cement, Lime Plaster, Fire-brick and General Building Material in the Southern States, and have stocks of Standard Brands at all of the Atlantic and Gulf Seaports, and at our interior mills and warehouses, for prompt and economical distribution to all Southern territory. Write for our delivered prices anywhere. Also Southern agents for the "Dehydratine's" waterproofing material. "Universal," "Acme" and "Electroid" Brands Ready Roofing. Get our prices.

Charleston, S. C. Birmingham, Ala. Atlanta, Ga. New Orleans, La

DEXTER Portland Cement THE NEW STANDARD

Sole Agents SAMUEL H. FRENCH & CO. Philadelphia

UNION MINING COMPANY

Manufacturers of the Celebrated

MOUNT SAVAGE FIRE BRICK GOVERNMENT STANDARD

DEVOTE a special department to the manufacture of Brick particularly adapted both physically and chemically to

Lime Kiln and Cement Kiln Construction

Large stock carried. Prompt shipments made. Write for quotations on Standard and Special shapes, to

UNION MINING CO., Mount Savage, Md.

CAPACITY, 60,000 PER DAY. ESTABLISHED 1841.

Special Features

The Catskill Aqueduct

Concrete Roads in Eight Cities

This Is the Second Article in the New Department Devoted to Good Roads

FOR GRIFFIN TUBE AND BALL MILLS

CHICAGO BELTING CO.

PURE OAK TANNED LEATHER BELTING

Send for Our Illustrated Catalog

111 North Green St., CHICAGO

FOR DAMP PLACES

Branches: NEW YORK PHILADELPHIA NEW ORLEANS PORTLAND, OREGON

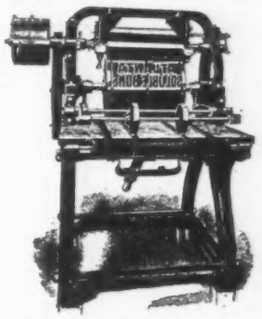
KOEHLER BAG PRINTER

is not only the fastest bag printer on the market---but the best and cheapest as well.

Write to us today for full particulars and prices. Hundreds of them in daily use giving perfect satisfaction.

The Henry L. Koehler Manufacturing Co.

410 W. Main Street, Louisville, Kentucky



Phoenix Portland Cement UNEXCELLED FOR ALL USES.

Manufactured by

PHOENIX PORTLAND CEMENT CO.

NAZARETH, PA.

Sole Selling Agent, WILLIAM G. HARTRANFT CEMENT CO

Real Estate Trust Building, PHILADELPHIA, PENNSYLVANIA.

Ottawa Silica Co.'s Washed White Flint Sand

Is used for sawing stone in more than a dozen states. Cuts more and lasts longer than any other sand on the market. Unexcelled for Roofing, Facing Cement Blocks, White Plaster, etc. Freight rates and prices on application.

OTTAWA SILICA CO., Ottawa, Ill.

The Ironton Portland Cement Co.

Manufacturers of the

Celebrated Limestone Brand of Portland Cement

Used by the Railroads in Kentucky, Ohio, West Virginia, and Virginia during the past five years.

Cement as finely ground as any on the market.

Guaranteed to pass all the standard specifications.

Plant located at Ironton, O., within easy access to seven States, namely, Ohio, Indiana, Kentucky, West Virginia, Virginia, Tennessee and North Carolina.

Shipments via the N. & W. Ry., C. & O. Ry., C. H. & D. Ry., D. T. & I. Ry., or Ohio River.

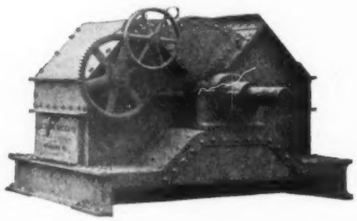
Write for Prices

The Ironton Portland Cement Co.

Ironton, Ohio

"PENNSYLVANIA"

HAMMER CRUSHERS



For Pulverizing Limestone, Lime, Cement Rock, Marl, Shale, Etc.

Main Frame of steel, "Ball and Socket" Self aligning Bearings; forged Steel Shaft; Steel Wear Liners; Cage adjustable by hand wheel while Crusher is running.

No other hammer Crusher has such a big Safety Factor.

PENNSYLVANIA CRUSHER CO.

Philadelphia

New York **Pittsburgh**

CANADA CEMENT COMPANY LIMITED — PORTLAND CANADA CEMENT — MONTREAL

MILLS

Montreal	Port Colborne
Hull	Shallow Lake
Belleville	Marlbank
Lakefield	Winnipeg
Calgary	Exshaw

For Prices Any Where in CANADA

Write or Wire Our Nearest Sales Office

Canada Cement Company LIMITED

Montreal - Toronto

Winnipeg - Calgary

Quality, Quantity and Co-operation

Let our nation-wide co-operative advertising campaign focus the demand for cement into your warehouse. Let our eleven mills supply your need and let our quality insure you increasing demands for

Lehigh Portland Cement

Chicago, Ill. **Allentown, Pa.**

ALPHA PORTLAND CEMENT COMPANY — ALPHA PORTLAND CEMENT — GENERAL OFFICE EASTON, PENNA — MANUFACTURERS

ONE GRADE—ONE BRAND

Alpha Portland Cement

Best in the World for Sidewalks

Write for our Handsomely Illustrated Book. Sent Free.

General Offices: No. 7 Center Square, EASTON, PA.

SALES OFFICES:

The Oliver Bldg., PITTSBURGH.
Builders Exchange, BALTIMORE.
Marquette Building, CHICAGO.
Harrison Building, PHILADELPHIA.
Builders Exchange, BUFFALO.
Board of Trade Bldg., BOSTON.
Hudson Terminal Bldg., N. Y.
Nat'l Bank Bldg., SAVANNAH, GA.

NORTHWESTERN STATES PORTLAND — PORTLAND — NORTHWESTERN — CEMENT — MASON CITY, IA. — Coreham System

"THE BEST IS NONE TOO GOOD"

HIGHEST GRADE of Portland Cement

Every Barrel Absolutely Uniform.

R. R. facilities especially adapted for prompt shipments in the northwest.

Capacity 1,500,000 bbls. Yearly.

NORTHWESTERN STATES PORTLAND CEMENT COMPANY

MASON CITY, IOWA

WOLVERINE PORTLAND CEMENT CO. — WOLVERINE — PORTLAND CEMENT — GENERAL OFFICES, COLDWATER, MICH. U.S.A. — REGISTERED TRADE MARK

"WOLVERINE"

The Alright Cement

MADE RIGHT SOLD RIGHT
WORKS RIGHT
WEARS RIGHT

The Best is None Too Good For You. Insist Upon.

"WOLVERINE"

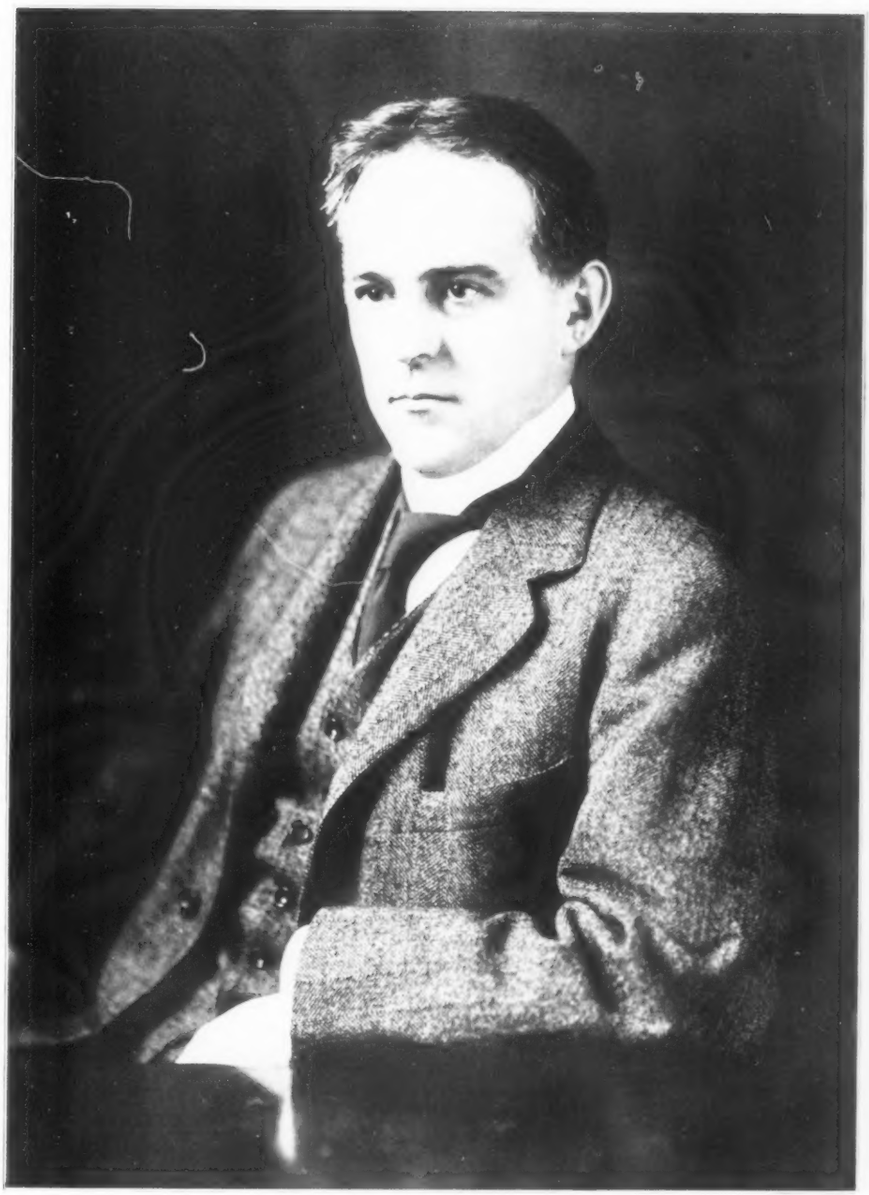
Write for Booklet and Quotations.

Factories at Coldwater and Quincy, Mich.
Capacity 3500 Daily.

WOLVERINE PORTLAND CEMENT COMPANY

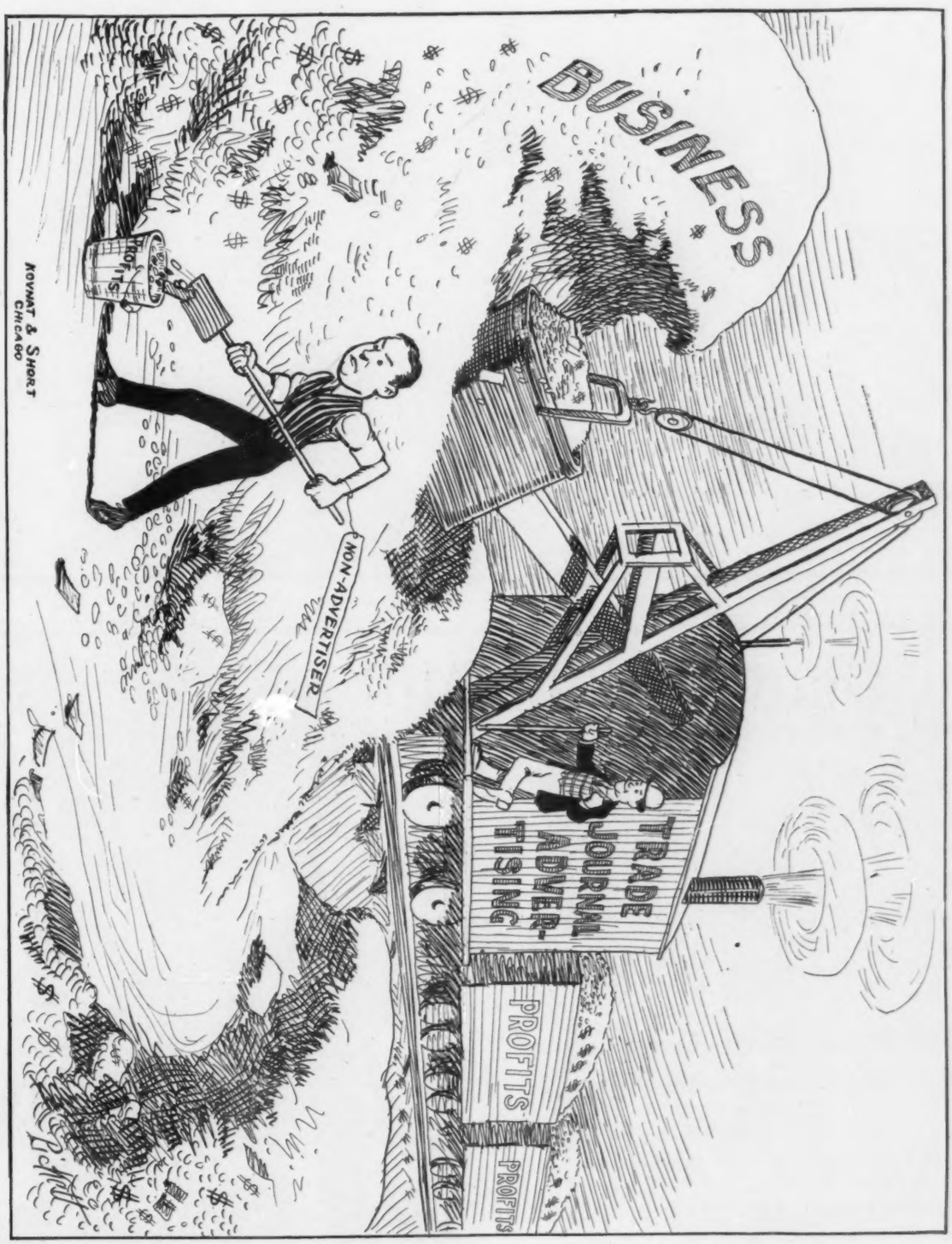
W. E. COBEAN, Sales Agent, Coldwater, Michigan

Main Office, Coldwater, Mich.



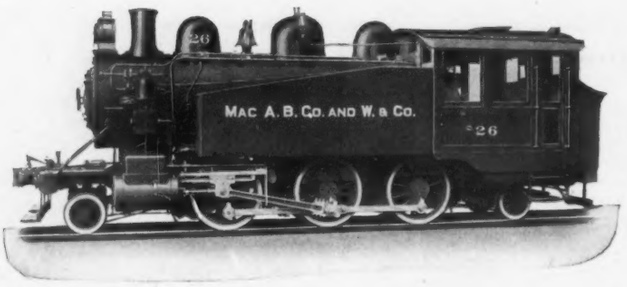
F. P. JONES

MONTREAL, CAN.



JUST A DIFFERENCE IN QUANTITY

Industrial Locomotives



Industrial locomotives are required to withstand the roughest and most severe service. To provide necessary durability, strength and efficiency under such conditions requires careful design, best materials and proper construction.

To the designing and building of locomotives this company brings accumulated knowledge of over seventy-five years' experience in building locomotives for every service, together with special study of conditions to be met.

All material is subjected to severe tests. High quality of material, combined with careful design and good workmanship, insures strength, long life and satisfactory results. Every part is accurately finished to standard gauges, and must fit every locomotive of the same size and design.

Because of wide experience we are in position to be helpful to you in the selection of a locomotive best suited to your work.

AMERICAN LOCOMOTIVE COMPANY

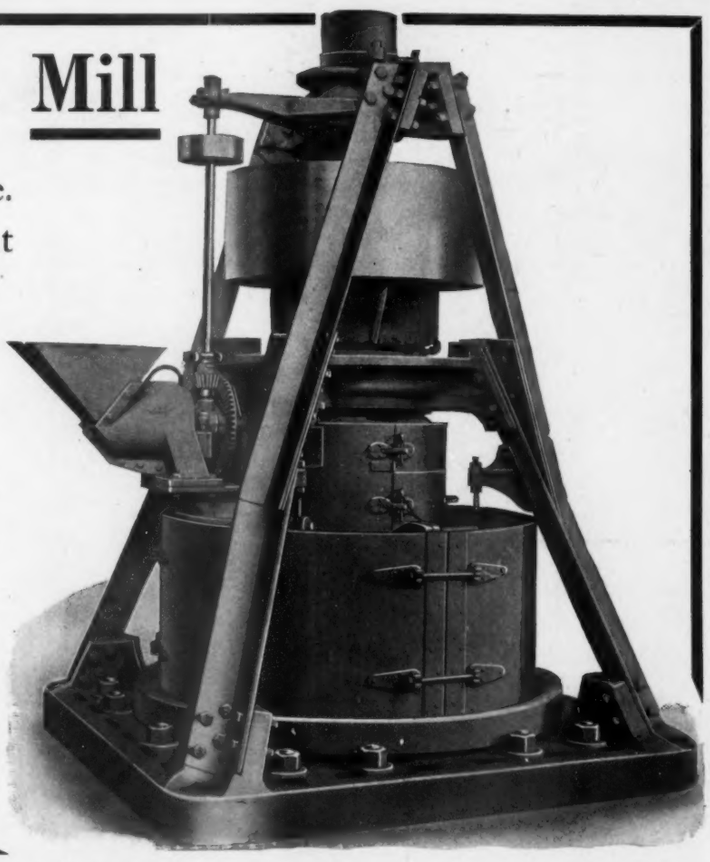
30 CHURCH STREET, NEW YORK

McCormick Building, Chicago — Dominion Express Building, Montreal, Canada

N. B. Livermore & Company, Los Angeles; San Francisco; Seattle; Portland, Oregon

The Giant Griffin Mill

TAKES Clinker Kiln Size.
GIVES A Finished Cement Ready to Sack.



Capacity

Minimum, 12 bbls. Maximum, 17 bbls. Per Hour.

Power

From 60 to 65 H. P. Operates Mill at Full Capacity

Upkeep under 1 Cent per bbl.

THINK IT OVER

Bradley Pulverizer Co.

BOSTON, MASS.

Tell 'em you saw it in ROCK PRODUCTS

"Forgot to Oil It—"

The oft-repeated story of the man whose plant is out of order. Don't rely on memory, and you'll avoid expensive shut-downs. In the Symons Breaker, lubrication is automatic. The oil pump's memory never fails. Read the rest.

There Is Only One Crusher with an *Automatic* Oiling System

The Crusher's Life Blood is Oil

Rock breakers work under most trying conditions, continually enveloped in a cloud of dust. It is very difficult, even with the "tightest fit," to exclude dirt from the running parts. The bearings are subject to immense pressures, very irregularly applied. When you add to these unfavorable conditions the further danger of careless supervision, any mechanic will admit the vital importance, to the practical quarryman, of the automatic oiling system peculiar to the

Symons Crusher

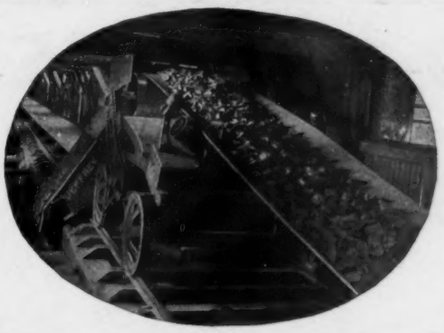
The oil pressure excludes the dirt. Where oil cannot get out, dirt cannot get in. The steady flow of oil (volume variable to suit conditions) washes the bearings clean, smooth and cool, immerses the gears and then returns to the tank to be used again.

It's a winning combination—only two big bearings, carrying a greatly reduced working pressure, guarded from dirt and protected from wearing and heating by a continuous oil-flow, with the working load evenly distributed over the surface of the long eccentric. But that's not half the story which we would like to tell you. Write for our catalog No. 166.

The T. L. Smith Co.

1322 Majestic Building, MILWAUKEE, WIS.

Old Colony Building, CHICAGO, ILL.
Schofield Building, CLEVELAND, O.



Jeffrey Rubber Belt Conveyers

offer large economies in handling Stone, Ores, Rock, Sand, Gravel, etc., and may be adapted to meet any condition.

Our long experience in building Belt Conveyers has resulted in a thorough knowledge of what constitutes suitable equipment of this character.

JeffreyTrippers provide a uniform distribution of material into bins or at any point along the conveyer line.

They are automatic in operation; occupy small space, operate with minimum horse power.

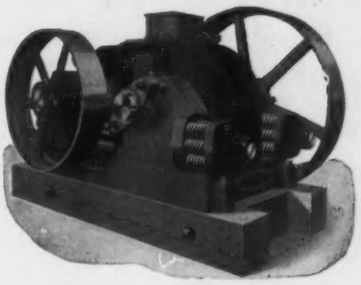
Request our Catalog 67-D, giving more complete information on this subject.

Jeffrey Mfg. Company

Columbus, Ohio

New York Chicago | Pittsburgh Charleston, W. Va. | Birmingham Atlanta, Ga. | Denver | Boston St. Louis | Montreal Seattle

Eventually You Must Use Crushing Rolls



To Produce Fine Crushed Stone for Top Dressing, Concrete Work and Fertilizer

We fit them with rolled, Chrome or Manganese steel shells whichever is desired.

Sizes 12″x12″ to 54″x24″ with or without automatic adjustment.

The long life of these machines together with the small amount of power and small cost for repairs makes them an economical machine to use.

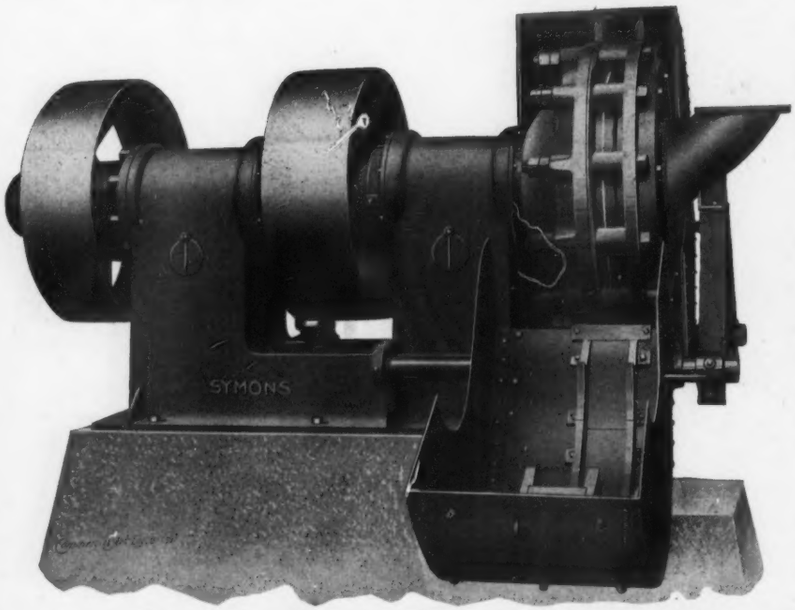
WE BUILD JAW AND GYRATORY CRUSHERS

CHALMERS & WILLIAMS

INCORPORATED

General Office, Chicago Heights, Ill. New York Office, Singer Bldg.

Don't Rest or Sleep



Until you **investigate the facts regarding the Symons Disc Crusher** if you need a machine to follow a large breaker and reduce the rejections to small sized product.

Exceptionally Strong and Durable

Remember a 48" Disc Crusher equals three No. 5 gyratories in the work of reducing 8" rejections to any size wanted between 2½" and ¾".

Ask for references to see this demonstrated. Inquire what other sizes are doing.

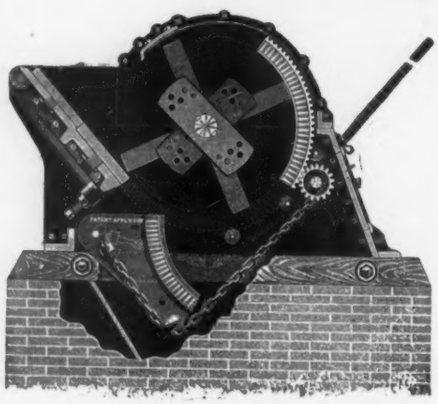
Address

SYMONS BROTHERS COMPANY, Majestic Building **Milwaukee, Wis.**

WILLIAMS JUMBO CRUSHER

Will take 12 to 14 in. cubes Limestone or Shale and reduce to 2 inch,—1½ inch,—1 inch,—¾ inch and finer.
1 No. 6 Recently Replaced 3 No. 5 Gyratories.

"MANUFACTURED AND LICENSED UNDER 87 SEPARATE AND DISTINCT PATENTS."



WITH DUMP CAGE OPEN.

Iola, Kansas, December 6th, 1910

Williams Patent Crusher & Pulverizer Co., St. Louis, Mo.

Gentlemen: Your No. 6 Jumbo Crusher recently installed by us is handling about 100 tons per hour of crushed limestone from a No. 8 Gyratory Crusher, the largest pieces of which will average six inch cubes.

The capacity of our elevator is 115 tons per hour and the machine easily overloads the elevator. We are now installing an elevator of double the CAPACITY FOR THIS CRUSHER. Your guarantee was fifty tons per hour from this machine.

Your crusher reduces all of our material to three-quarter inches and finer, and the majority to one-quarter inch.

We have been operating the machine about eight weeks and find same most satisfactory.

Yours very truly, THE IOLA PORTLAND CEMENT CO., F. L. WOODS, Supt.

MADE IN 8 SIZES—ALL PARTS ADJUSTABLE

Ask Iola Portland Cement Co., Texas Portland Cement Co., Southwestern Portland Cement Company,—or us. Write for Bulletin 12.

WE ALSO MAKE LIMESTONE GRINDERS

WORKS: 2701 N. Broadway, ST. LOUIS
SAN FRANCISCO, 347 Monadnock Bl'dg.

THE WILLIAMS PATENT CRUSHER & PULVERIZER COMPANY

OLD COLONY BL'DG.———CHICAGO

Knickerbocker Portland Cement

Semi-Wet Process

Lightest (gray) Color of all Portland Cements, Manufactured in a Model Plant by Modern Methods, Shipped by Rail or Water—Quick Deliveries

HIGHEST QUALITY

Users of "Knickerbocker" Say it is Uniform, Finely Ground, and Works Most Satisfactorily

Join the "Knickerbocker Family"

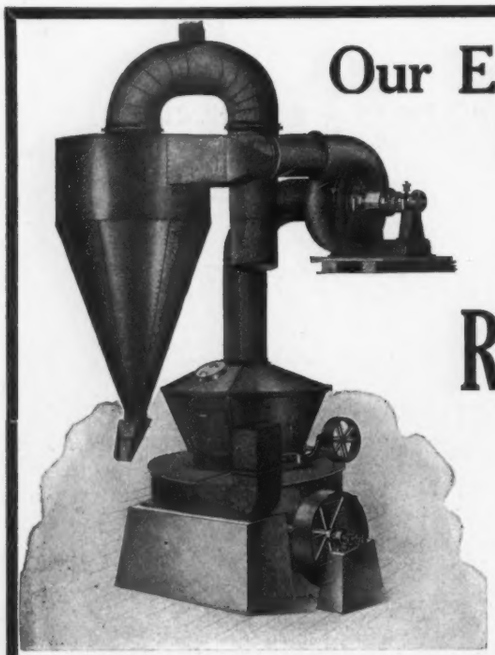
Permit Us To Ship You Now

Knickerbocker Portland Cement Company

WORKS: Hudson, N. Y.

GENERAL SALES OFFICE: One Madison Avenue New York City

Tell 'em you saw it in ROCK PRODUCTS



Our Engineers May Help Solve Your GRINDING PROBLEMS

The Raymond Pulverizing System with Air Separation has solved many grinding problems in mills of widely differing character. For a finely and uniformly ground raw material or finished product, there is no system which equals the

RAYMOND PULVERIZING AIR SEPARATING SYSTEM

By adjusting the mill to the required mesh the air separators automatically take the powdered product from the mill while the grinders are working and delivery is continuously made to the point desired.

No bolters, reels or screens are used, hence no clogging and no expensive upkeep for these antiquated devices.

No product escapes to choke the employes, hence there is no waste or tailings. Many industries have revolutionized their methods of manufacture and have effected savings amounting to hundreds of thousands of dollars per year by installing the Raymond System.

Consult our Engineers before you adopt the wrong pulverizing system.

We design special machinery and methods for Pulverizing, Grinding, Separating and Conveying all powdered products. We manufacture Automatic Pulverizers, Roller Mills, Vacuum Air Separators, Crushers, Special Exhaust Fans and Dust Collectors.

Raymond Bros. Impact Pulverizer Co., 517 Laflin Street, Chicago, Ill.

PLEASE CUT OUT THIS

REMINDER

To write Raymond Bros. Impact Pulverizer Co., 517 Laflin St., Chicago, for their Book "I" on Modern Methods of Pulverization and Air Separation. (10)

JOIN

Rock Products'

Campaign for Good Roads

HIGH GRADE

FIRE BRICK

For Cement Works, Lime Kilns, Cupolas, Steel and Iron Works of every description

LOUISVILLE FIRE BRICK WORKS, Highland Park, Ky., P.O

Incorporated.

There is a Space—

FOR SALE ON THE FRONT COVER

Write to day for Special Price

ROCK PRODUCTS
537 S. Dearborn St., Chicago, Ill.

Twelve Stories of Solid Comfort in
The Heart of New York

Hotel York

Strictly Fireproof

36th Street Corner 7th Avenue

2 minutes walk from New Penn. R. R. Station and 10 minutes from Grand Central Terminal, one short block to Broadway.

Accommodations better than rates indicate—Desirable Rooms $1.50 and $2.00 bath privilege—Desirable Rooms $2.00 to $4.00 with private bath.

Write for Pocket Map of New York City.

H. G. Williams, Manager.

CRUSHING AND ELEVATING OUR SPECIALTY

Elevator Buckets
Malleable Chain
Elevator Belts
Portable Elevators
Stationary Elevators
Stone Crushers
Sand Screens

BURRELL MFG. COMPANY, Bradley, Ills.

Rock Products' Advertisers Are All Satisfied

Breaker Shafts

Crystallization

is the cause of the breaking of most crusher shafts and is the result of severe, continued and frequent shocks.

To prevent this trouble we have developed special "anti-fatigue" steel shafts which are oil tempered and heat treated.

These shafts are forged in our own shops which contain special equipment for the purpose, including one of the most powerful hydraulic presses ever built, the use of which assures a homogeneous forging.

These shafts are slow to show crystallization under the severest crushing conditions and will outlast any shaft ever before manufactured.

The greatly increased length of life of these shafts make them much more economical than the ordinary shaft even at the higher first cost.

For

TRAP ROCK GRANITE IRON ORE

ALLIS-CHALMERS CO.

MILWAUKEE - - WISCONSIN

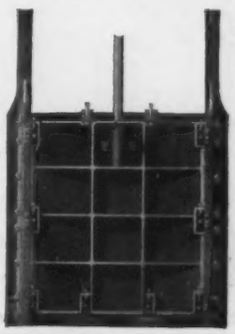
65 SLUICE GATES

FOR

THE NEW CATSKILL AQUEDUCT

THE DEEPEST SIPHON TUNNEL IN THE WORLD

have been made and are being set by the



Coldwell-Wilcox Co.

Box 475, Newburgh, N. Y.

We have made a specialty of Sluice Gates and Hoisting Apparatus for nearly thirty years. The quality of our product is the best obtainable.

Correspondence Invited—Illustrated Catalog on Request

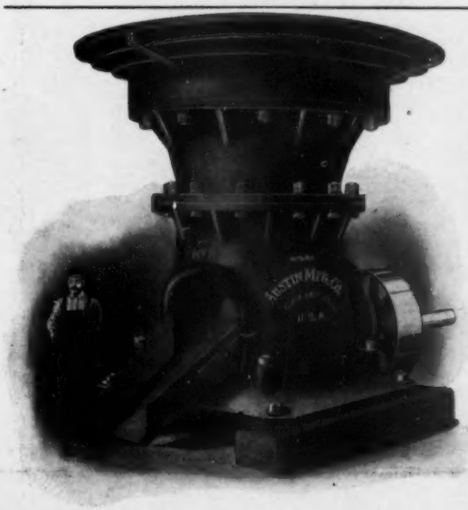
True Manganese Steel Castings for All Wearing Parts of Crushers.

ALSO

Open Hearth Steel Castings and Alloys: Vanadium, Nickel, Etc.

AMERICAN Steel Foundries

New York Pittsburgh
Chicago St. Louis
Monadnock Building, San Francisco



AUSTIN GYRATORY CRUSHER

The World's leading rock and ore breaker.

The only self lubricating Crusher.

The only Crusher having double countershaft bearing.

Simple construction, correct design.

Thousands in use.

Plans and specifications furnished for any sized plant.

Send for Catalogue No. 17.

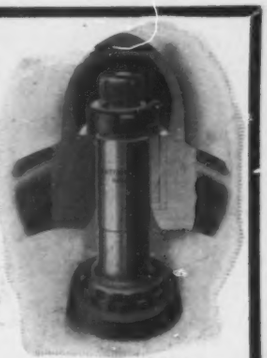
All experienced users recognize that the efficiency and durability of the suspension bearing as applied to Gyratory Crushers, depends upon locating the bearing at the point of least gyration or movement of the main shaft.

A perfect suspension can be made only by locating the bearing at the point where there is no movement of the shaft. That being a mechanical impossibility it follows that superiority is obtained in fixing the bearing at the point of least gyration of the shaft.

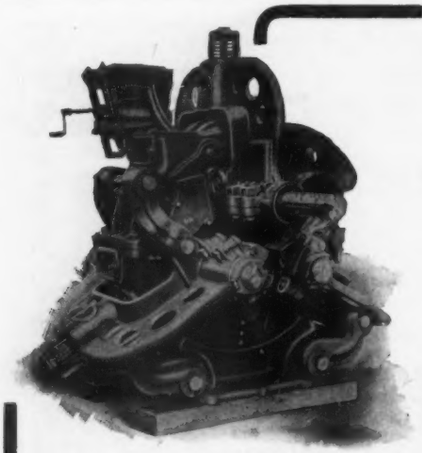
As the accompanying cut will show, the movement of the shaft at the point of suspension in the Austin Crusher is reduced to the minimum and practically eliminated. Consequently the highest possible degree of efficiency and durability is obtained.

Austin Manufacturing Co., Chicago

Mussens Ltd., Montreal, Can., Canadian Sales Agents.



New York City Office
1682 FULTON BUILDING
Hudson Terminal



MAXECON

Means MAXimum of ECONomy

Years of experience with the assistance of our hundreds of customers has found THE SOLUTION OF GRINDING HARD MATERIALS. The MAXECON PULVERIZER combines highest EFFICIENCY, greatest DURABILITY and assured RELIABILITY. Uses the LEAST HORSE POWER per capacity. Embodies the features of our Kent Mill with improvements that make it MAXECON.

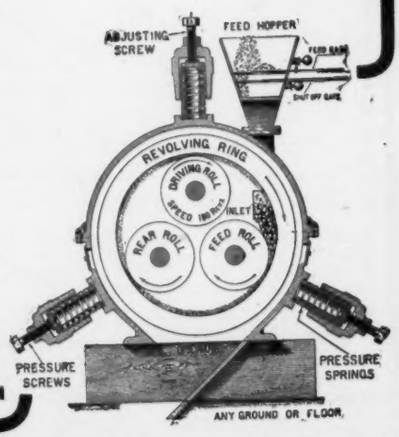
WE DO NOT CLAIM ALL of the CREDIT for this achievement

We have enjoyed the valuable suggestions of the engineers of the Universal Portland Cement Co. (U. S. Steel Corp.), Sandusky P. C. Co., Chicago Portland C. Co., Marquette Cement Mfg. Co., Western P. C. Co., Cowham Engineering Co., Ironton P. C. Co., Alpena P. C. Co. Castalia P. C. Co., Pennsylvania P. C. Co., and many other patrons.

THE RING WOBBLES

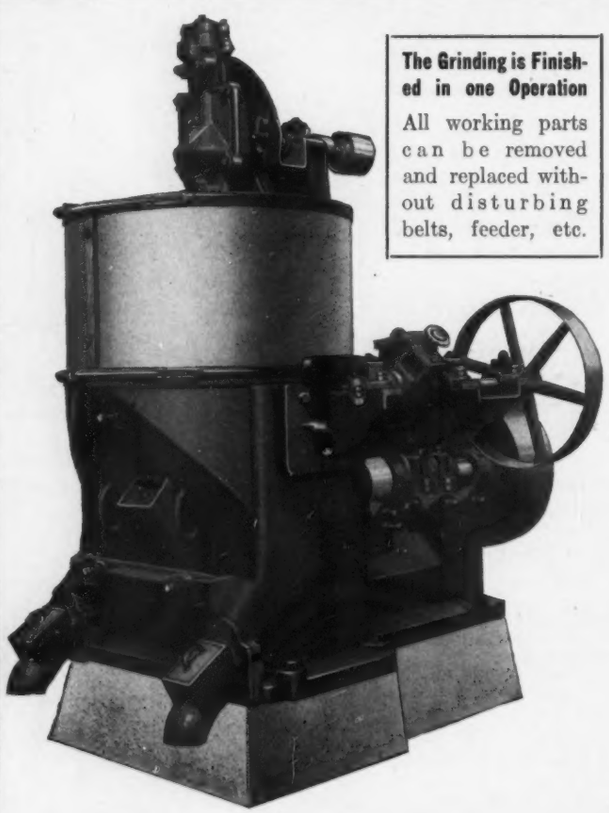
The FREE WOBBLING POUNDING RING instantly and automatically ADAPTS its position to the variations of work.

Its GRINDING ACTION is DIFFERENT than any other; besides the STRAIGHT rolling action of the rolls, the SIDE to SIDE motion of the ring makes the material subject to TWO crushing forces and DOUBLE OUTPUT results.



KENT MILL CO.

10 RAPELYEA ST., BOROUGH OF BROOKLYN, N. Y. CITY
LONDON, W. C., 31 HIGH HOLBORN
CHARLOTTENBURG 5, WINDSCHEID STRASSE 31, BERLIN



The Grinding is Finished in one Operation

All working parts can be removed and replaced without disturbing belts, feeder, etc.

BONNOT PULVERIZER

Grinds and Screens Limestone, Raw Lime and Hydrated Lime

Does it at One Operation. Gives You Any Desired Fineness

GRINDING LIME IS LARGELY A SCREENING PROPOSITION. THE BONNOT PULVERIZER HAS THE LARGEST SCREENING SURFACE AND CONSEQUENTLY THE GREATEST CAPACITY.

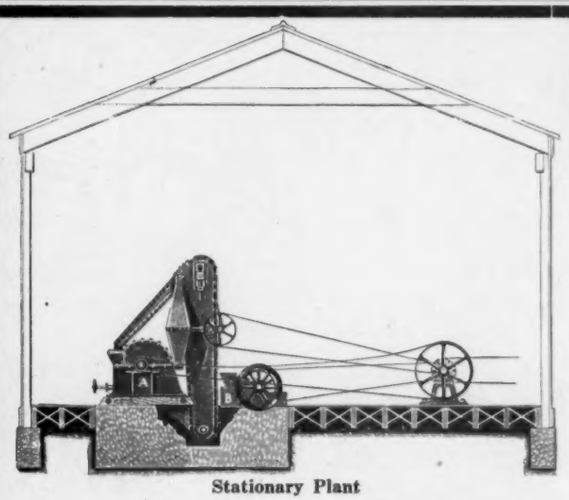
NO OTHER MACHINE LIKE IT IN THE ACCESSIBILITY OF SCREEN AND GRINDING PARTS.

No. 4 Catalog Explains These Advantages

THE BONNOT COMPANY

909 N. Y. Life Bldg.
KANSAS CITY, MO.

CANTON, OHIO



Stationary Plant

Get Into the Game

GRIND YOUR LIMESTONE SCREENINGS AND MAKE LIMESTONE FERTILIZER

What Is Now a Dead Loss to Some Quarrymen
Can Be Turned Into Good Profits

WE FURNISH COMPLETE PLANTS OF ANY CAPACITY DESIRED

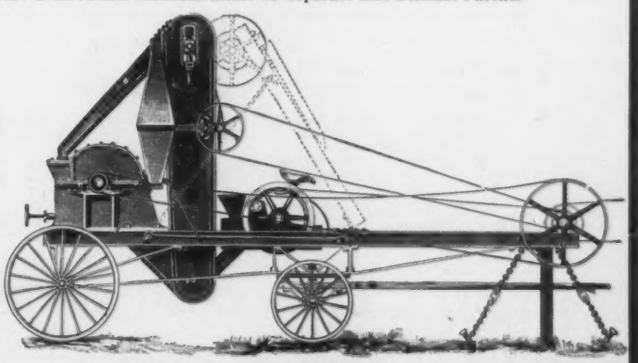
Manufactured and Licensed under 87 Separate and Distinct Patents

We now have over 30 plants in operation

BULLETIN NO. 4 EXPLAINS THE PROPOSITION

The Williams Pat. Crusher & Pulv. Co.

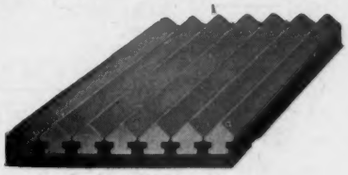
ST. LOUI 2705 N. Broadway
CHICAGO: Old Colony Bldg.
SAN FRANCISCO: 428 Monadnock Bldg.



Portable Plant

A Tempered Steel Jaw Plate for Blake Type Crushers

CHROME STEEL WORKS
CHROME, N.J., U.S.A.
FORMERLY OF BROOKLYN, N.Y.



Canda Tempered Steel Crusher Jaw Plate

Patented March 31, 1908

¶ The Canda Tempered Steel Jaw Plate for Blake Crushers is composed of Forged and Rolled Chrome Steel Bars, cast-welded and also mechanically interlocked into a backing of tough steel—and the wearing face is tempered to extreme hardness. We are equipped to supply both corrugated and smooth face plates for all sizes and makes of Blake Crushers.

¶ The Canda method of cast-welding forged and tempered steel bars into a mild and tough Steel Backing, is adapted also to the construction of Cone Heads for Gyratory Crushers, Segments for Corrugated Rolls, etc., etc.

¶ Our products in this line are sold with our special guarantee that they *will wear longer, give better satisfaction and, at our price, prove more economical than any others now on the market.*

—Send for Descriptive Pamphlet—

Represented by

J. F. Spellman, 202 Century Building, Denver, Colo. George T. Bond, Easton, Pa. George W. Myers, San Francisco, Cal.

FARREL ORE AND ROCK CRUSHER

USED IN ALL PARTS OF THE WORLD—LARGE RECEIVING CAPACITY—SPECIALLY DESIGNED AND CONSTRUCTED FOR HARDEST KIND OF WORK

COMPLETE CRUSHING PLANTS OUR SPECIALTY

• SEND FOR CATALOGUE •

EARLE C. BACON, ENGINEER.

FARREL FOUNDRY & MACHINE Co. HAVEMEYER BUILDING, NEW YORK

Save 20% in Operating Expense

by replacing cast tooth gears with Nuttall Cut Gears.

Nuttall Cut Gears reduce vibration to the minimum, assuring long machine life and a better product.

For more information about the gears that will save you money

Write

Nuttall - - Pittsburgh

When in a hurry, wire us.

Mitchell Service

is one of the things we are proud of. With our large capacity and advantageous position we make prompt shipments.

We have two railroads to ship over and our Traffic Department always follows cars through to destination so as to insure quick deliveries. You need this when you buy lime.

Our customers always have a great deal of satisfaction when they order lime from us for they know they will be taken care of **promptly.**

Besides service they get the **strongest white lime** made. **MITCHELL LIME** keeps well and when mixed, slacks fast on account of its high calcium content. It analyzes 96% calcium oxide. It carries more sand, lays more brick and works easier than ordinary lime.

TRY US AND WE WILL MAKE GOOD

MITCHELL LIME COMPANY

WORKS: Mitchell, Ind.

528 Peoples Gas Bldg., Chicago, Ill.

Every Arrow points to a State or Province where Dealers handle
THE PERFECT FINISHING LIME.

Tiger Brand Hydrated Lime

stands for quality. It means that every job where it is used will give satisfaction and, therefore, more sales for the dealer who handles it. It insures permanent customers.

Write for Prices

The Kelley Island Lime & Transport Co.

CLEVELAND, OHIO

MONARCH HYDRATED LIME

The National Lime & Stone Co.
CAREY, OHIO

Waste Means Loss of Money

WASTE means that you are reaching down into your pocket and meeting leaks that should not exist. For more than seven years we have been expounding the merits of

Monarch Hydrated Lime

As a result, thousands of contractors will use no other. They have learned by experience that it more closely approaches perfection than any other lime, because there is absolutely no waste.

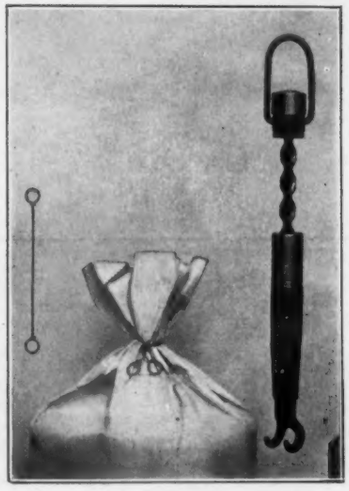
They know that it requires no screening.

That it takes more sand; gauges with one-third less plaster and spreads farther and easier than lump lime.

These are features that are causing thousands to use *Monarch Hydrated Lime.* Are you one of this number?

The Curry Bag Tyer

NO LONGER AN EXPERIMENT——A PRACTICAL SUCCESS



The PROOF

102,500,000 bags tied last year.

2,500 tools in service.

Over 700 active customers including 75 Cement plants, 60 Lime and Plaster mills, 100 Largest reinforcing contractors.

Necessitating a manufacturing capacity in the United States 2,000,000 ties a day, and a plant in Germany manufacturing 320,000 ties a day.

Suitable for any bag. Binds the intersection of reinforcing rods. **Economical, Practical and Secure.**

SEND FOR CATALOGUE E AND PRICES

CLIFFORD L. MILLER & CO. SOLE AGENTS 110 E. 23d St., NEW YORK

We have begun suit against a maker and seller of a similar tool and are prepared to enforce our rights under our patents against all infringements.

The Ohio and Western Lime Company

WORKS AT
Huntington, Indiana
Marion, O.
Gibsonburg, Ohio
Festoria, Ohio
Sugar Ridge, Ohio
Tiffin, Ohio
Genoa, O.
Limestone, Ohio
Lime City, Ohio
Portage, Ohio
Luckey, Ohio
Bedford, Ind.

MANUFACTURERS OF AND WHOLESALE DEALERS IN

Ohio and Indiana White Finishing Lime, Ground Lime, Lump Lime, Fertilizer Lime, Hydrate Lime, Cement, Plaster, Hair, Etc., Etc.

MAIN OFFICE: Huntington, Ind. Branch Office: Marion, Ohio.

Capacity 8000 Barrels Per Day

BANNER HYDRATE LIME

That Made Gibsonburg, Ohio, FAMOUS

MANUFACTURED BY THE

NATIONAL MORTAR & SUPPLY CO.

PITTSBURG ∴ ∴ PENNSYLVANIA

CROWN HYDRATE

HIGH CALCIUM HYDRATED LIME

At present prices you can waterproof, improve the color and strengthen the texture of all cement construction and actually **save money**, because the Hydrate **replaces** the same amount of cement (15 to 25%).

Kritzer Vacuum Process

MARBLEHEAD LIME COMPANY

KANSAS CITY CHICAGO

DEALERS ATTENTION

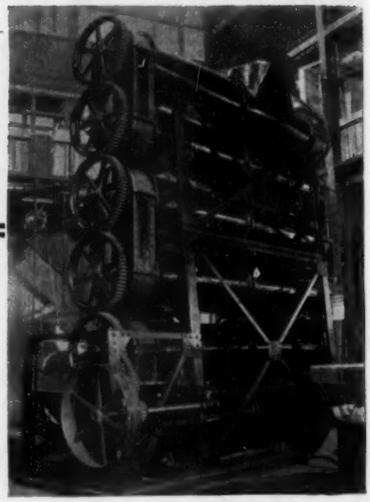
We manufacture the STRONGEST LIME IN OHIO and can ship promptly in straight or mixed cars, **Lime** in bulk or barreled, **"Masons Hydrate"** for brick work and masonry, **"Clover Grower"** Hydrate for improving the soil. Also from our Northern Ohio plant, in straight car lots, **"Lime Flour,"** a pure white magnesia Hydrate for white coat, none better, Quality the best.

A dealer wanted in every city to handle our products. Write or wire for prices.

THE SCIOTO LIME AND STONE CO., Delaware, Ohio

HYDRATED LIME

Bulletin No. 43



KRITZER CONTINUOUS PROCESS

The Government Lime Statistics for 1910 have just been issued. According to this report the quantity of lime manufactured in 1910 was less than that produced in 1909, while the quantity of Hydrated Lime manufactured showed an increase of more than 50%. This shows the drift of the lime business. What evidence could be more convincing?

You Will Eventually Establish a Hydrating Plant Why Not Do It Now?

We can prove to you positively that by so doing,
Your sales will be increased.
Your expense of manufacture will be no more.
Your overhead expenses will be less.
Your product will always be perfect. We guarantee this absolutely.
You will have every dealer praising your product.
Every dealer will handle More Lime.
Every concrete worker can do Better Work.
Every concrete worker can do More Work in Less Time.
He will make More Money and hence will wish to use More Lime.
He can do the Same Work with Less Men.
The work will be Impervious to Moisture.
The Concrete will Work Easier and Look Better, in fact, Be Better.

The cost of installation is not heavy. Let us give you prices.

We would be pleased to give you estimates covering **your particular case,** free of all charge.

We can convince you that it has paid handsomely to erect a Hydrating Plant, not merely in one instance, but in every instance.

The Kritzer Way Is the Right Way

98 per cent of all the ideas used in Hydrating Lime are Kritzer ideas.

An Absolutely Perfect Product, Positively Assured by this Process.

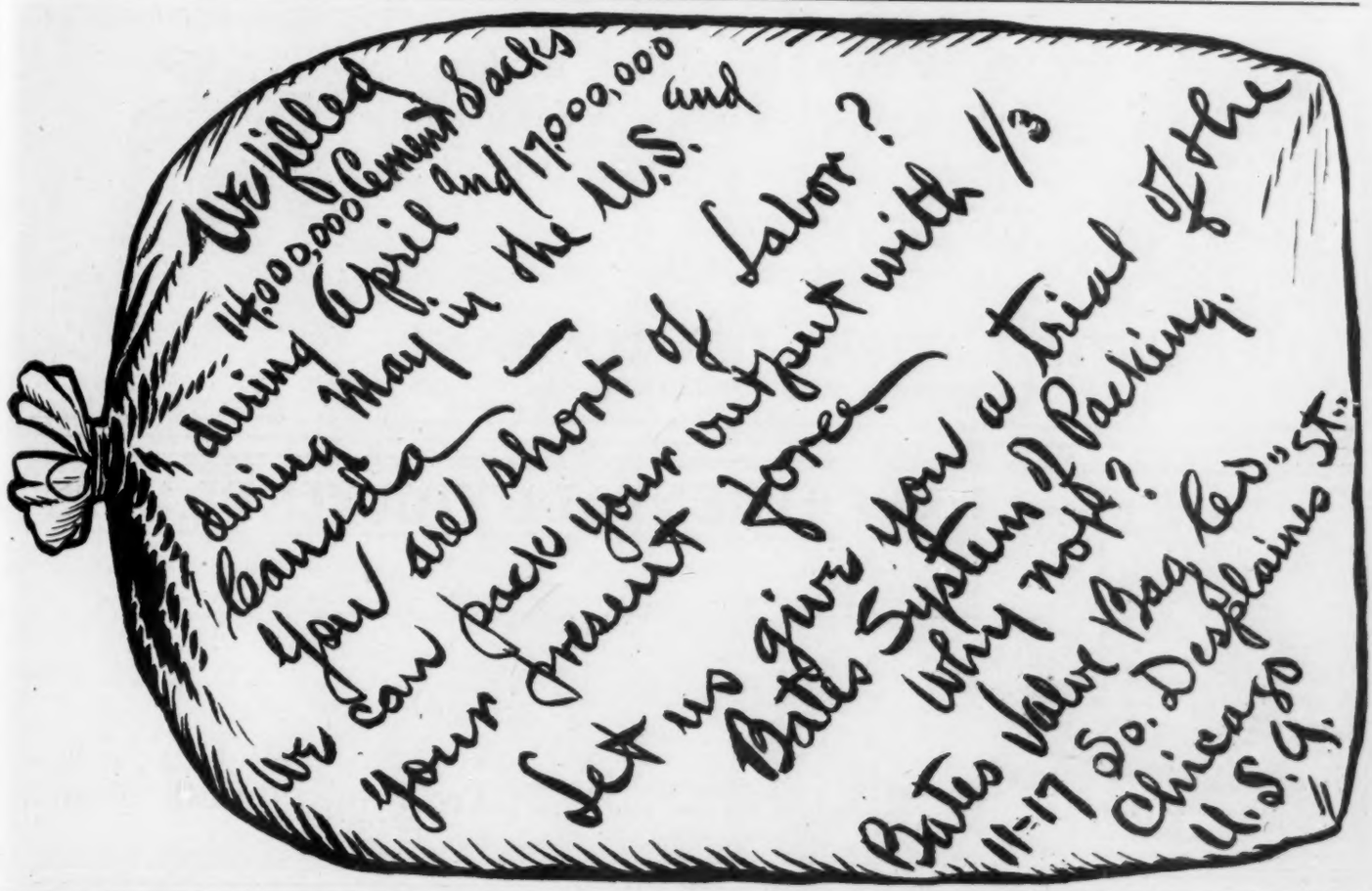
A Bond Behind Every Guarantee.

It takes several months to install a plant.

Why not take this matter up with us **Now** and get ready for business as soon as possible?

The Kritzer Company

115 Adams Street
Chicago, Illinois


We filled 14,000,000 Cement Sacks during April and 17,000,000 during May in the U.S. and Canada —
You are short of Labor?
We can pack your output with 1/3 your present force.
Let us give you a Trial of the Bates System of Packing.
Why not?
Bates Valve Bag Co.
11-17 So. Desplaines St.
Chicago
U.S.A.

WELLER-MADE

The Weller Lime Hydrator is Adjustable

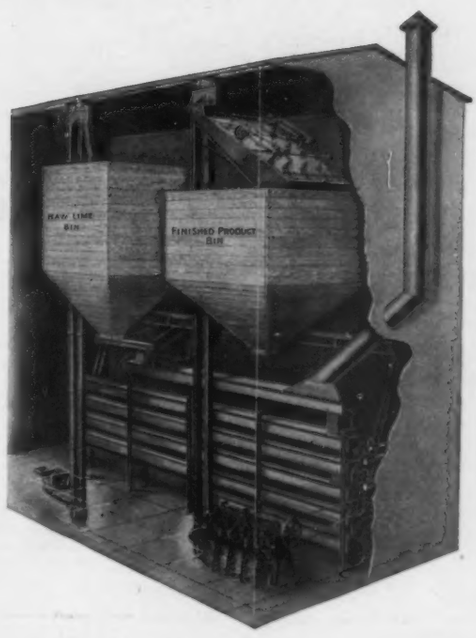
for any grade of lime. This feature of adaptability is important.

The Weller Hydrating System insures the highest satisfaction at the lowest installation and maintenance costs.

Guaranteed capacities, thoroughness of construction and ease of operation, are other features which you cannot afford to overlook.

Complete descriptions sent upon request.

Write us for estimates when you need elevating, conveying or power-transmission machinery of any escription.



Weller Mfg. Co.
Chicago

Manufacturers of wire bag ties for all purposes. All lengths wire ties manufactured for tying reinforcing rods. Write for prices, etc.

Patent applied for

THE UNITED WIRE TIE COMPANY

1341 Nicholas Bldg., TOLEDO, OHIO "Dept. A"

Clyde Hydrator with Hood
"The common sense way".

EXPERIMENTAL HYDRATE PLANTS

Are expensive to install and operate and very questionable as to their ability to produce a marketable product.

CLYDE HYDRATORS have been in successful operation seven years, over 80 now in operation here and abroad. Their ability to produce a marketable product has raised the out-put of one firm from 40 to 450 tons per day, and still growing.

A CLYDE HYDRATOR will give greater capacity, at less operating cost per ton, will produce a more uniform product, more thoroughly hydrated, than any other hydrator on the market, **AND,** the **FIRST COST** of a **CLYDE PROCESS HYDRATING PLANT** is 35% less than **any other process of equal capacity.** Let me prove this true. Don't decide on hydrating equipment until you know the **FACTS.** Ask me for a copy of the treatise on Hydrated Lime written by a recognized authority for the American Institute of Chemical Engineers. Comparative quotations gladly furnished on plants or machines of the capacity you desire.

H. MISCAMPBELL, 318 St. Croix Ave., Duluth, Minn.

Patentee and Sole Manufacturer of Clyde Hydrators

Plasticity, Great Sand Carrying Qualities

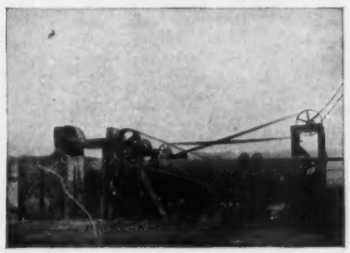
Quick Hardening Great Strength

Alca Lime

is the only material possessing all of these qualities.

Aluminate Patents Company

2211 Chestnut Street
PHILADELPHIA, PA.



AN INSTALLATION FOR DRYING SAND

"What We Dry"

is a little booklet we have just issued. It will certainly interest you as it shows what substances are dried in Ruggles-Coles "Double Shell" Dryers and the names of some of the 300 and over installations. Sand and gypsum are dried in Ruggles-Coles Dryers at a large number of plaster, brick, and cement plants, over half a hundred being used for this service.

SEND FOR THIS BOOKLET TO-DAY

Ruggles-Coles Engineering Co.

McCormick Building, CHICAGO — 50 Church Street, NEW YORK

(37-85)

Use Victor No. 6, 7 or 8 Electric Fuzes With

DU PONT

Blasting Machines

To Insure Complete Detonation of Explosives

Detonating a series of charges electrically not only results in deriving the full benefit from the explosives, but it is also a safer, quicker and easier method.

The Du Pont Blasting Machines have capacities for firing one to one hundred Victor No. 6 electric fuzes simultaneously, thereby effecting an economy of both time and labor as compared with the method of firing each charge singly by fuse and cap.

Electrical firing is obviously much the safer method, because the operator is able to place himself in a perfectly safe position and control absolutely the instant at which the blast shall be made.

Therefore, attain maximum output by securing the greatest efficiency from the explosive employed, and provide the greatest degree of safety for your employes by using Du Pont Blasting Machines exclusively.

Send for Blasting Supplies Catalog No. 115 giving complete description of Du Pont Blasting Machines and Blasting Supplies.

Du Pont Powder Company

Wilmington - - - Delaware

AETNA

40 per cent Aetna Gelatin is the best explosive for breaking hard rock in wet or dry work, because it contains within a given space the greatest amount of rending power at the right speed for rock breaking. Waterproof, dense, uniform.

THE AETNA POWDER COMPANY

7 SOUTH DEARBORN STREET, CHICAGO

Bank of Commerce Building, ST. LOUIS, MO. — 33 North High Street, COLUMBUS, O. — Woodward Building, BIRMINGHAM, ALA. — Mass. Building, KANSAS CITY, MO. — Torry Building, DULUTH, MINN

Knoxville, Tenn. — Chattanooga, Tenn. — Iron Mountain, Mich. — Xenia, Ohio

Tell 'em you saw it in ROCK PRODUCTS

DIRECT HEAT

DRYERS

—FOR—

BANK SAND
GLASS SAND
ROCK, CLAY
COAL, ETC.

All Mineral, Animal and Vegetable Matter.

We have equipped the largest plants in existence and our dryers are operating in all parts of the world. Write for list of installations and catalogue S. C.

American Process Company

68 William Street, NEW YORK CITY

Lime Making Economy

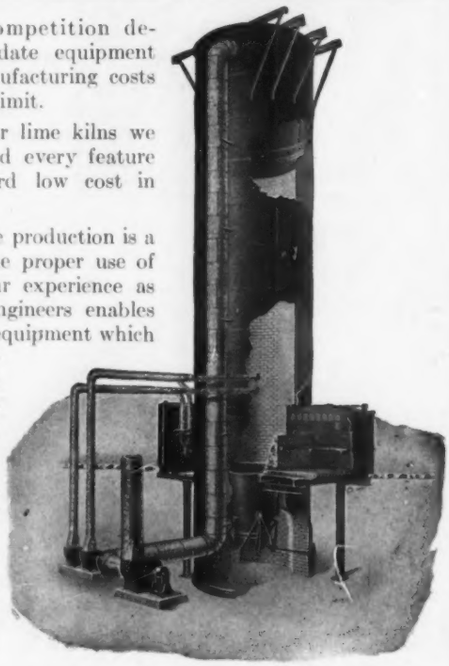
Present-day competition demands up-to-date equipment to bring manufacturing costs to the lowest limit.

In designing our lime kilns we have embodied every feature looking toward low cost in lime making.

Economical lime production is a question of the proper use of fuel. And our experience as combustion engineers enables us to furnish equipment which will give the largest output of high-grade lime per pound of fuel burned.

We furnish kilns using either wood, coal, oil, or natural or producer gas as fuel.

Write for Bulletin No. 4.



Improved Equipment Co.

Combustion Engineers

EXECUTIVE AND SALES OFFICES
60 Wall Street, NEW YORK

MEDUSA

WATERPROOFED WHITE

PORTLAND CEMENT

TO THE EXTENT OF OVER 5,000 BARRELS IS BEING USED IN THE NEW WOOLWORTH BUILDING, NEW YORK CITY, THE HIGHEST BUILDING IN THE WORLD, HERE ILLUSTRATED

The First True White Portland Cement Ever Manufactured

PERFECTLY WHITE IN COLOR AND STAINLESS

THE BRAND THE U. S. GOVERNMENT HAS USED IN FIFTY BUILDINGS IN THE PAST TWO YEARS

FOR EXTERIOR AS WELL AS INTERIOR WORK

Write for free booklets and samples of

MEDUSA WHITE PORTLAND CEMENT

MEDUSA WATERPROOFING

MEDUSA WATERPROOFED CEMENTS
(GRAY AND WHITE)

SANDUSKY PORTLAND CEMENT CO.
SANDUSKY, OHIO

THE CUMMER DRYERS

For Mechanically Drying Everything. The F. D. Cummer & Son Co., Cleveland, O.

WORRELL'S ROTARY DRIERS

FOR SAND, CLAY, ROCK PRODUCTS AND OTHER GRANULAR MATERIALS.

Excellent Results Moderate in Cost and Expense of Operation

In sending for prices and printed matter describe your material fully, giving its percentage of moisture, required hourly capacity, etc.

S.E.WORRELL
HANNIBAL, MO.

(First Manufacturer of Rotary Fire Drying Machines in the U. S.)

Farnam "Cheshire" Lime Co.

OF CHESHIRE, MASS.

MANUFACTURERS OF THE

Celebrated Cheshire "Finishing" Lime

Well known throughout New York and the Eastern States as the finest finishing lime manufactured. The special feature of this lime is its quick and even slacking, thus preventing any cracking or checking when put on the wall. It is the best lime used in the country today for all

HIGH GRADE FINISHING WORK

Selling Department, 39 Cortlandt St., N. Y., C. J. CURTIN, Pres't.

CLB257932

ROCK PRODUCTS

ESTABLISHED IN LOUISVILLE, KY., 1902.

DEVOTED TO CONCRETE AND MANUFACTURED BUILDING MATERIALS.

Volume XI. **CHICAGO, JUNE 22, 1912.** **Number 12**

Publication day, 22nd of each month.

THE FRANCIS PUBLISHING COMPANY

EDGAR H. DEFEBAUGH, Prest.

Seventh Floor, Ellsworth Bldg., 537 South Dearborn St., Chicago, Ill., U. S. A.

Telephone Harrison 8086, 8087 and 8088.

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EDGAR H. DEFEBAUGH, FRED K. IRVINE.

MANAGING EDITOR.

CHARLES D. WARNER.

BURDIS ANDERSON, Manager.

Communications on subjects of interest to any branch of the industry are solicited and will be paid for if available.

Every reader is invited to make the office of Rock Products his headquarters while in Chicago.

Editorial and advertising copy should reach this office at least five days preceding publication date.

TERMS OF ANNUAL SUBSCRIPTION.

In the United States and Possessions and Mexico.....$1.00
In the Dominion of Canada and all Countries in the Postal Union..... 1.50

Subscriptions are payable in advance, and in default of written orders to the contrary, are continued at our option.

Advertising rates furnished on application.

Entered as second-class matter July 2, 1907, at the Postoffice at Chicago, Illinois, under Act of March 3, 1879.

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POLITICAL SITUATION.

The extraordinary developments in national politics, as emphasized to an unusual degree by the peculiar complications of the Republican convention, have naturally engaged public attention in a way that has not often been seen before during the preliminary stages of a presidential campaign. The strife between contending forces in both parties has become sufficiently acute to cause more or less unsettlement in states where the fight has been peculiarly bitter. But business in general has not been seriously disturbed by what has taken place, and it is questionable whether it will be. People are feeling better than they did, the whole country is gradually doing an enlarged business, our foreign trade is highly satisfactory, and the general bank position of the United States is stronger than it usually is at this season of the year. As compared with the situation existing a year ago, when two enormous industrial concerns—the Standard Oil Company and the American Tobacco Company—were being dismantled and no one knew just how the future order of things would work out, the outlook at the moment is certainly more reassuring.

If you want others to have confidence in you, give them some good reason.

Fall business will be pouring in before you realize it. Will you be fully prepared to meet the rush?

The average customer doesn't care about being argued with and the sensible dealer never wastes time that way.

The disagreeable job is seldom half as troublesome as expected if it is attacked vigorously, determinedly and without putting it off to a more convenient day.

Study your rival's methods, his stock, his advertising. Perhaps after all he really knows more about the business than you do. At any rate he's a mighty poor opponent if you don't learn something.

There is no doubt that the individual who kicks and grumbles the worst about the hot weather feels it the most. The farmers are not kicking. At this writing they can hear the corn growing.

If you gain the customer's confidence it is easy to sell goods, and it is wisdom to never force on a buyer stock you really believe he does not need. It may result in the purchaser's bill being a little smaller today, but if he learns that you are thoroughly sincere in your statements, carefully so, the reward will come another time.

"I don't fight any more, mamma," said a pugnaciously inclined little chap whom we heard about. "When the other boys bother me, I just knock 'em down and go right along." An excellent idea in business when troubles and worries come along to harass. Don't argue and fight, but deal them a knockout blow and then go right along. In many things in life the wisdom of this young pugilist might well be followed.

A frog jumps readily enough when put in warm water, yet a frog can be boiled without a movement if the water is heated slowly enough. In a physiological experiment at Yale University the water was heated at the rate of .0036 of a degree a second, Fahrenheit. The frog never moved, and at the end of two and one-half hours was found dead. He had evidently been boiled without noticing it. There are hundreds of business frogs. They are not sensitive to changing business conditions. The evolution from old-time methods to present-day bright advertising has not startled them and they die a slow business death without realizing it.

The effect of the concrete road article published in the May Rock Products has been tremendous. More than 15,000 reprints of this article have gone out all over the country and will be read by road commissioners and county commissioners everywhere, and the educational effect of it should be of no small value. It is the intention to keep up this department every month and tell the world of the value of cement as a road building material. No pains or expense will be spared to get the best information obtainable on the subject, and to that end we invite the co-operation of all those interested in the good roads movement. In this issue of Rock Products appears another article showing what has been done in other sections.

With cement manufacturers in the east willing to sell cement at 60 cents at the mill, there does not seem to be very much hope of an early revival of prosperity in the business. It does seem as though there are enough real men who have the ambition and the ability to wind up this ball of yarn so the present demoralized conditions will not prevail. One does not wish to be caught in the gust, but when you look at the building material business in Chicago and realize one of the best years in the history of the world is on, building permits are 10 per cent to 12 per cent greater than last year in all recognized cities, and yet in many of them material is selling below cost. This applies to cement, lime, plaster, lath, lumber, brick, fireproof material, etc., all due to the unrestrained competition of wilful men and the war cry of the people, "Let's have a change." This change may be a slogan from the department of justice of the National Government making it illegal to sell any manufacturer products below cost. This would be a good thing. It is just as much justice, is it not, as the demands made by this same department that men should not get together and talk over their troubles and try and keep from stepping on each other's toes in a business way.

EDITORIAL CHAT

NEW EXPERT HERE.

Chicago has added to its number of experts, who are devoting their brains and energy to the building up of the cement industry, one of the best in the business. He is C. L. Carmen, who has established an office at 919 Insurance Exchange Building, where he may be found by those who are in need of his services. Mr. Carmen has had extensive experience in the designing and enlarging of cement plants and is thoroughly competent to handle any proposition. His most recent accomplishment is the building of the Riverside, Cal., plant that is considered one of the model mills of the Pacific Coast. He is thoroughly versed in the business and knows technically all the ins and outs of the cement industry. He will prove a valuable acquisition to Chicago, which has become the center of everything worth while.

J. E. Vebleng of the Superior Mfg. Co., Minneapolis, Minn., dropped down to Chicago the other day to see the lights burn, and incidentally look up some business proposition. He reports that the Twin Cities have that showing of prosperity that precedes as well as follows the successful crop conditions in the Northwest.

Of the visitors in Chicago this past month we had the pleasure of visiting with Otto E. Wasem and H. W. Blockson, president and sales manager respectively of the Wasem Plaster Co., Fort Dodge, Iowa. They are delivering the Monarch brand in the West—and very successfully, too. They report business conditions in their section very favorable and look forward to a prosperous year in plaster.

We have a letter from John R. Holloway, Buffalo, N. Y., which says: "We have been and are at present very busy getting our plant in shape for the season's work. We are making several important changes in our plant this spring, namely, opening a new pit for our supply of fine lake sand, and also changing the location of one of our local yards. We will have, when these changes are completed, greatly improved facilities for both production and delivery of material by either rail or water. All of the details of these changes have not been worked out as yet, so that we feel that this would be an inopportune time to attempt a description of our equipment. We believe the outlook for future business is quite satisfying."

Frank M. Clutter, who used to rustle around the country for ROCK PRODUCTS, is now in business for himself. He had been with the X. L. All Concrete Machinery Co. at Kansas City for a year and now we are informed that he has come out in full bloom in the proprietor class. He is the president, first vice-president, second vice-president, general manager, general superintendent, assistant general superintendent, publicity manager, advertising manager, general promoter and a few others things of the new company, manufacturing the United States Champion Cement Roofing Tile Machinery, at 1903 E. 36th St., Kansas City, Mo. It is the hope of his friends that he will plaster the entire map of the United States and Kentucky with cement roofing tile machinery. He has the rights for this and all foreign countries. All those who come late may stay for the next show.

SOMETHING OF A MYSTERY.

We quote the following from "El Commenrci," of New York:

"Al dorar pulseras, sadenas spaghetti y joyas parecidas deben examinarse bien las hoocheemakooch junturas asegurándose el operarrio de que están bien soldadas á fin de que no entre la solución en las banana junturas causando Frederico Paulson moustachio de consiguiente un error en el cálculo del oro depositado cuando lo compruebe con el peso."

The friends of Fred Paulson were much alarmed when they read this. Fears were entertained that it might be a Black Hand threat. Investigation, however, shows that it refers only to his moustache, which was recently severed from his front elevation. Mr. Chittenden said:

"Fredd th' Pauls! He cutta the mush, but Lee is the high! Carambo!"

When Fred was asked about his moustache he shrieked:

"————!————!!————!!!"

A GREAT ENGINEERING FEAT.

The natural resources department of the Canadian Pacific Railway makes the announcement that contract will soon be let for what is said to be one of the most notable engineering feats on the American continent. It is for the construction of a cement flume 2½ miles long, 16 feet wide and 10 feet deep. It will be erected on pillars some 16 feet in height and is to be built in connection with the company's irrigation projects in Bassano, Alberta, and will be used to carry water across a valley 2½ miles in width. It will be the main waterway of the system.

CANADA'S CEMENT PRODUCTION.

The production of cement in Canada last year showed a substantial increase both in quantity and value, the total output amounting to 5,635,950 barrels, valued at $7,571,299, as compared with 4,753,975 barrels produced in 1910, having a value of $6,412,215.

RAYMOND W. DULL.

One of the best known men in the engineering, contracting, designing and equipping of a sand and gravel plant, is Raymond W. Dull, whose portrait is shown here. Scattered about the country are examples of his skill. He is known as one of the most expert men in the business. He is a graduate from the University Engineering Department at the University of Illinois, having received the degree there in June, 1910, after a general view of work. He is a member of the American Society of Mechanical Engineers, and the Western Society of Mechanical Engineers. He is an associate member of the National Association of Sand & Gravel Producers. Since his graduation he has made a specialty of conveying, transmission and screening machinery. He designed and handled the Tompkins-Cove Stone Company's plant, which is the largest stone crushing plant in the world, having a capacity of ten thousand tons a day. He designed the conveying system of the Copper Queen Consolidated Mining Company's Sacramento shaft, the first system of the kind for handling copper ore direct from the shaft. He designed the conveying system which drains the material for the large irrigation dam at Milner, Idaho. This is one of the largest earth dams ever built. It is 143 feet high, 2,000 feet long and the base covers 12 acres. He handled the first big steel conveyor which carried the crusher stone from Edison's giant rolls, as well as several since for the same purpose. Mr. Dull had charge of the engineering department of three prominent manufacturing companies previous to starting the present company of Raymond W. Dull & Co. of Aurora, Ill. This company makes a specialty of equipping sand and gravel shafting plants, stone crushing plants and conveyor systems. He has also contributed a number of articles on engineering subjects, one of which, Bin Formulae and Construction, has been republished several times. The whole article is reprinted in Prof. Ketchum's book on retaining walls, bins and grain elevators. Prof. Ketchum gives due credit for the work to Mr. Dull.

RAYMOND W. DULL, AURORA, ILL.

History Makers of the Building Material Industry

The remarkable progress made by the Canada Cement Company, Limited, with headquarters at Montreal, has been the wonder of the trade. This company is playing a prominent part in the upbuilding of the new empire of cities, towns and farms in the virgin Northwest. Then, too, another thing: Every cement man in the United States will be interested in watching the progress made by this company, because it did, and without delay, what seems to have been an impossibility in this country. It found and applied a remedy for over-production and cut-throat prices within a few months after true conditions had been found out, and in a unique way, which it seems was a benefit not only to those who had money invested in cement, but the dealers and users as well.

F. P. Jones, general manager, is yet a young man—born forty-one years ago in Brockville, Ontario. He was educated at the Royal Military College, Kingston, and first went into business with the D. F. Jones Shovel Manufacturing Company, in Gananoque.

Being ambitious, and having a liking for the steel business, he engaged with the Nova Scotia Forge Company, and later the Dominion Iron & Steel Company, of Sydney, N. S., the largest concern of its kind in Canada. At the end of three and a half years he had been promoted to the position of general sales manager, and from this position to that of general manager of the company, so at the age of thirty-three Mr. Jones was head of Canada's largest industrial institution.

Under his management the steel company prospered and its future looked rosy, when the famous controversy arose between the steel company and the Dominion Coal Company over a contract for the supply of coal. This brought Mr. Jones into the limelight, for, being satisfied that he was right, his way prevailed, and his company refused the coal tendered by the coal company on account of quality. War was immediately declared, and the biggest and most interesting industrial law battle every fought in Canada followed. Mr. Jones could see it only one way and, according to what the lawyers say, the testimony he gave in the case came near being a masterpiece from a legal standpoint.

After a long and hard-fought battle Mr. Jones won, and while we don't know how many millions of dollars were involved in the suit, we do know that the first check paid by the coal company to the steel company on account was for $2,700,000.

Just about this time the Canada Cement Company was formed, and eleven of the best and most advantageously located plants in Canada were merged. These plants extended practically from coast to coast, and it was at once seen that no ordinary man was needed to whip things into shape, to make money for the stockholders, and at the same time satisfy the public, as well as the handlers and users of cement, for this company was destined to become a mighty trust.

Mr. Jones was conceded to be the man the company wanted, and on January 1st, 1910, became its general manager. Immediately the work of permanent organization began, and within a short time the big merger was moving along like clockwork. Prices were immediately adjusted, and at the end of the first and second years again adjusted, and after each adjustment prices were found to be lower than the year before.

To many, these reductions came as a great and pleasant surprise, for the opposite policy was expected, but to others it was different, because they remembered that when Mr. Jones first took hold he said, "We will get our cost down, and we will sell the people of Canada our product, and at a lower rate than was ever sold before on normal basis." So it was just what they expected.

Mr. Jones is a strong, far-seeing, shrewd and able man, thoroughly democratic, and amiable, almost to a fault; a slave to his work, yet never seems to be busy; gives every caller a hearing and listens carefully to what he has to say and sends him away smiling. There is no unnecessary pomp or show about Mr. Jones—simplicity is one of his principal charms. He always has a good word and a pleasant smile for everybody from the office boy up, and has a peculiar way of making each of his men feel that the business belongs personally to him.

Those who know him best feel that there is bound to be a place for him in the front row of the world's leaders in the cement industry.

CEMENT IN NEW YORK WATER PROJECT

Nearly $100,000,000 Being Expended in a Great Project For the Betterment of the System.

(By Alexander E. Kohn, Statistician, Board of Water Supply.

One of the most gigantic enterprises undertaken by any municipality, and ranking with projects of our own and foreign governments, is now in process of construction by the city of New York, through its Board of Water Supply. The project involves the bringing to the metropolis of an entirely new and independent supply of pure and wholesome water from the Catskill Mountains, 100 miles away.

In the later nineties, investigations by officials and public-spirited organizations demonstrated that by the time additional comprehensive works could be constructed a water famine would threaten the city, and that the time for action looking toward an additional supply of water was at hand. Five million people make a thirsty community, and with the need for the liberal use of water in sprinkling streets and lawns, fighting fires, feeding factory boilers, and in the home for washing, bathing, cooking, etc., a large and constant supply is necessary. Compared with other large American cities, the per capita consumption of water in New York is moderate, indicating economy in its use; but in spite of this economy the margin of safety is very small. Only energetic measures for the prevention of waste, combined with providential rains, have saved the city from a threatened water famine during the recent severe and extended drought of 1910-11.

The city's present supply comes from both surface and underground sources, practically all owned by the municipality. The supply from surface sources is obtained from reservoirs formed by dams across streams, while the underground supply is pumped from natural reservoirs in the water-bearing sub-surface soil.

At present the boroughs of Manhattan and the Bronx are supplied from the Croton and Byram watersheds, municipally owned surface systems twenty-five miles from the city. The boroughs of Brooklyn, Queens and Richmond are supplied from both surface and underground sources, part public and part private, the main supply coming from the water-bearing sands and gravel of Long Island. The total safe yield of all of these sources is about 500,000,000 gallons daily. These sources have been developed to their economic limit, so that the city had to look to new and independent sources for an additional supply.

On June 9, 1905, the Board of Water Supply was created by the State Legislature, and after speedy but thorough investigation and study, supplementing researches by John R. Freeman and the Burr-Herring-Freeman Commission, it determined upon the watersheds in the Catskill Mountains as the most feasible. Of the four watersheds which it is intended to develop, the Esopus will be first, where, with a drainage area of 255 square miles, the Esopus Creek will furnish not less than 250,000,000 gallons daily. From the Ashokan Reservoir, which stores the waters of Esopus Creek, an aqueduct 126 miles long will convey the water to and through the city. The system includes three other reservoirs; one, the Kensico, about twenty miles from New York, for the purpose of storing several weeks' supply to provide for interruption to the aqueduct flow above it; the Hill View, just north of the city line, for the purpose of equalizing the varying hourly and daily needs of the city; and at the very end of the line, on isolated Staten Island, a distributing reservoir.

Ashokan Reservoir.

The Ashokan Reservoir, which is to impound the waters of Esopus Creek and hold it for delivery to New York, will be an immense lake of a capacity of 130,000,000,000 gallons of water. It is 12 miles long, and has a surface area of 8,200 acres. To form this reservoir a series of dams and dikes five and one-half miles long are now being constructed. The most imposing of these structures is the Olive Bridge dam, across Esopus Creek, consisting of a main portion of solid masonry, 1,000 feet long, with earth wings at each end 3,650 feet in length.

The maximum height of the masonry portion of the dam above its foundation is 220 feet. Its base is 200 feet wide, the cross section gradually reducing in width to 26 feet at the top, which will be crowned with a roadway. It is constructed of cyclopean masonry, which is built by depositing large batches of semi-liquid concrete and immediately lowering into the concrete large irregularly shaped sound stones, much larger than one man could handle, and in some cases weighing two or three tons. The dam is faced with concrete blocks, these being placed first and serving as forms for the cyclopean masonry. To prevent any possibility of leakage under the dam, a deep cut-off trench was excavated below the foundation, and as a still further precaution holes were drilled from the bottom of this trench and grouted to insure the sealing of any seams that might exist in the rock under the main body of the dam.

OLIVE BRIDGE DAM.

The wings of the dam are of selected earth, laid in four-inch and six-inch layers, each layer wet down and rolled with steam rollers. In their center is a core wall of concrete founded on solid rock or very compact impervious earth. A chain of earth dikes or embankments 4½ miles long, constructed across ravines where the natural barrier is below the flow line, will complete the retaining wall of the reservoir, these also being built with a concrete core wall in their center for their entire length.

For the construction of the main masonry section of the dam, 600,000 cubic yards of masonry will be required. To make this enormous amount of concrete a large crushing and mixing plant, of a capacity of 300 cubic yards in eight hours, was erected. Other stationary mixing plants of a lesser capacity and several portable mixers were also erected. Four cableways, side by side, completely span the creek canyon and are used in building the dam. A record progress was made in placing over 1,000 cubic yards of masonry in the dam every day for over a month.

GRADE TUNNEL.

The dams and dikes for the reservoir are being built under two contracts, the one just above described being the larger and amounting to $12,700,000. The quantities to be used in the construction of the Ashokan Reservoir are approximately as follows: Excavation, 2,550,000 cubic yards; refill and embankment, 8,350,000 cubic yards; masonry, 930,000 cubic yards; cement, 1,160,000 barrels. The contractors have assembled plants costing fully a million dollars, including 20 concrete mixers, 30 miles of railroad, 33 locomotives, 579 cars, 60 derricks, 7 cableways, stone crushers, steam rollers, steam shovels, compressor plants, etc.

Catskill Aqueduct.

From the Ashokan Reservoir to the city limits, 92 miles of aqueduct are under construction. The aqueduct has been designed for a capacity of at least 500,000,000 gallons daily. In its tortuous path the aqueduct traverses level ground, skirts hills, pierces mountains and dips under valleys.

There are four distinct types of aqueduct to meet these conditions: cut-and-cover, grade tunnel, pressure tunnel, and steel pipe siphon. The cut-and-cover will form 55 miles, will be of horseshoe shape, 17 feet high by 17½ feet wide, constructed of concrete in open cut trench, and afterwards covered with earth embankment. This is the least expensive type and is used in comparatively level country where the elevation of the land will permit. Where it is uneconomical or otherwise impracticable to circumvent a hill or mountain, a tunnel at the natural grade of the aqueduct is driven through it. Grade tunnels are also of horseshoe shape, 17 feet high by 13 feet 4 inches wide, lined with concrete, and form 14 miles of the aqueduct. For crossing broad valleys and where the underlying rock is sound, the pressure tunnel method is adopted. This consists of the excavation of a shaft on each side of the valley, and a tunnel to connect them. These shafts and tunnels are circular and are lined with concrete, the predominating inside finished diameter being 14 feet 6 inches. Besides the end or waterway shafts, intermediate shafts are sunk for convenience in construction. There are 17 miles of pressure tunnel. Steel pipe siphons cross valleys where conditions are not suitable for the pressure tunnel. The pipes are made of plates riveted together and laid in a trench down and up the sides of the valley. They will be lined with cement mortar, enveloped in concrete, and covered with embankment. One pipe, usually 9 feet 2 inches in diameter, is being laid at present, but to carry the full capacity of the aqueduct two others of similar dimension will be laid later. Of this type there are 6 miles.

Within the city limits the water will be conveyed through a pressure tunnel deep in the rock, 18 miles long, which will connect with the present water mains through 22 shafts, located about 4,000 feet apart. Arms consisting of large pipes extending from the terminals of the pressure tunnel will be built for the remote parts of the city. These will also connect with the present distribution mains. It was the original plan to construct huge water mains through the city's streets to convey the

Catskill water, but the great difficulties, including interference with traffic and present sub-surface structures involved in this plan, and the many advantages, including permanence and safety as well as ultimate economy in the pressure tunnel plan, led to the adoption of the latter method.

A spectacular and far-famed feature of the work is the crossing of the Hudson River. A favorable location for the crossing involved a geologic study of the river bed for a distance of several miles. The difficulty of the problem arises from the great depth to which it is necessary to go under the river in order to get into solid rock (solid rock being absolutely essential for crossing by the pressure tunnel method). Borings and soundings revealed the fact that while there was only about 95 feet of water at the deepest part, the drift and muck overlying the rock was several hundred feet deep. The preliminary investigations resulted in fixing the location at the Storm-King-Breakneck Mountain crossing, north of West Point, and all work was thereafter concentrated at that point, to find the highest elevation of solid rock. The exploration work was at first prosecuted by vertical borings put down from scows on the river along the line of the crossing, but after reaching a depth of 768 feet in the center of the river without striking solid rock, this method was abandoned. In the meantime a shaft on either shore was put down, and from a depth of about 300 feet in each, inclined diamond drill borings were begun toward the center of the river. This pair of holes crossed each other in the middle of the river at about 1,500 feet below the surface, passing continuously through solid rock, each boring being about 2,000 feet in length. Later a second pair of holes was drilled, starting from the same point, but at a flatter angle. These holes crossed each other at about 960 feet below the surface of the river and were also in solid rock for their entire length. It was thereupon decided to bore the tunnel between these two elevations; to be accurate, at an elevation of —1,100, which will give the necessary substantial covering of solid rock. The shafts which were started for exploratory work were continued down to this depth, and will form part of the permanent waterway of the pressure tunnel, making these shafts the deepest on the work. The distance across the river from shore to shore is over 3,000 feet.

No exceptional difficulties were encountered in sinking any of the 55 pressure tunnel shafts on the work, but in the deep Hudson River shafts an interesting phenomenon developed when a depth of about 800 feet was reached. The rock, though hard and sound, would chip from the sides of the shaft, without warning and with a sharp report. This "popping" of the rock grew more frequent with the increased depth. In spite of careful timbering, several slight accidents occurred, and finally a complete cylindrical plate-steel lining, fitting close to the sides of the shaft, was adopted, which overcame the difficulties.

In the construction of the pressure tunnel which crosses beneath the picturesque Rondout Valley, peculiar and difficult conditions were met. In its length of 4½ miles a veritable geologic museum was encountered, no less than eight different kinds of rock being found, varying from a soft shale which one could crush with the hand to a hard quartz conglomerate.

The methods of operation in the construction of the aqueduct vary, and are as different as there are contractors. In general, however, the contractors have assembled complete plants on the site of the work, in many cases building expensive and really pretentious plants. To a great extent this was necessary on account of the inaccessibility of the work and the consequent difficulty in making connections with established businesses.

CUT AND COVER SECTION.

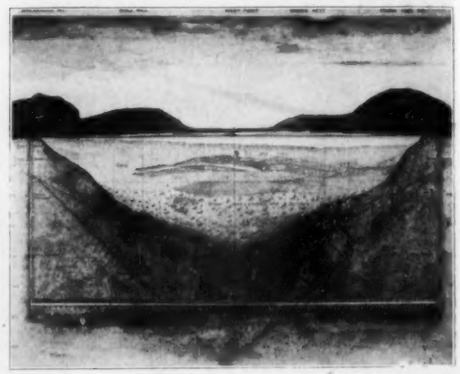
In general, the method followed in constructing the cut-and-cover type of aqueduct is to first excavate the trench with a steam shovel, trim it to subgrade by hand, and then concrete the invert or floor of the aqueduct. On the completed invert steel forms for receiving the concrete for the side walls and arch are erected. Usually the crushers are at the quarry, from where the aggregate is brought to the mixer, which is at some location convenient to the point of operation, trains running on the embankment on the side of the trench transporting the concrete to the forms. A crane picks the concrete buckets from the train and dumps them into the forms in the trench. After the concrete is finished the material previously excavated from the trench is refilled over the aqueduct and grassed.

STEEL PIPE SIPHON.

A plant which is novel in many respects, designed and built by the contractor, was used at one point of the work. This was a three-deck structural steel self-contained traveling concreting plant, 140 feet by 24 feet, moving on the finished invert as construction progressed, and carrying a pillar derrick, two gyratory stone crushers, sand rolls, sand and stone bins, and a concrete mixer, all operated by electricity. 140-foot bridge extended from the traveler, the far end resting on the finished arch of the aqueduct and spanning the forms in which the concrete was being placed. Concrete was carried out on the bridge from the mixer in one yard buckets and deposited, and the moving of forms was also accomplished by hoists on the bridge. This plant made a record progress for placing arch, the daily advance being 60 linear feet.

CATSKILL AQUEDUCT TUNNEL.

In driving tunnels the usual method of attack was to excavate a top heading or drift and then at some distance back excavate the bench or lower portion, these operations being sometimes carried on simultaneously. Another method not quite so generally used was to reverse the operation by excavating a bottom heading or drift and then shooting down the top portion of the tunnel. Compressed air was used almost entirely in operating the drills. Some particularly noteworthy progress has been made in the excavation of the shafts and tunnels. At a shaft which forms part of the permanent waterway of the Hudson River crossing, a progress of 183 feet a month was made in granitic gneiss. The shaft is circular in shape, the average excavation being about 16 feet 2 inches across. At one of the other pressure tunnels a heading was advanced 530 feet a month in Hudson River shale, which is believed to be the world's record in hard rock tunnels.



METHODS OF BORING TO FIND SOLID ROCK

Sanitation.

The construction of the Catskill waterworks employs an army of 15,000 men, mostly foreigners. Coming as they do from strange countries and unaccustomed to our standards of cleanliness and living conditions, it became a problem to properly guard their health as well as the health of communities near the camps where the laborers and their families lived. The board early recognized that proper sanitary precautions were of paramount importance, and in all of the contracts sanitary clauses have been inserted regulating the living conditions of the men, the disposition of drainage and refuse, etc. Inspectors have the power to enter and inspect the camps at any time, and employees violating sanitary rules may be summarily dismissed and not again employed. Ample supplies of wholesome water and food are insisted upon, and the employment of medical attendants and the housing of the sick, and, if necessary, their isolation, is provided for.

In some of the larger camps, and particularly the one at Ashokan Reservoir, there have been provided sewerage and water supply systems, special plants for the disposal of sewage, good dwellings with screens on all doors and windows, well-laid streets, electric lights, savings banks, hospitals, kindergartens and day and evening schools. These camps in many cases are more modern and better equipped than the communities adjoining the work.

A uniformed police force, specially organized under law, has helped in enforcing sanitary regulations, law and order.

Aeration and Filtration.

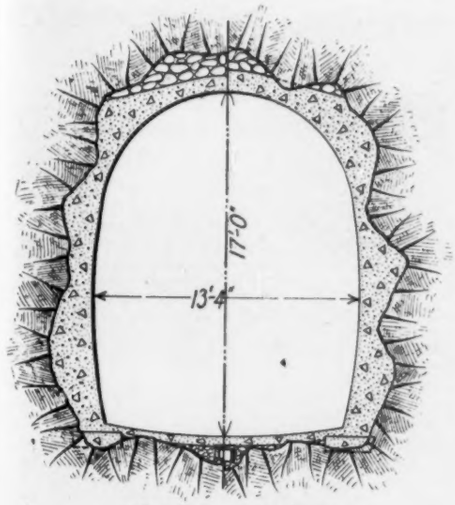
To eliminate tastes and odors due to growths or decomposition, a thorough aeration of the water as it passes from the Ashokan impounding reservoir and the Kensico storage reservoir will be resorted to. Aeration plants are now being constructed, containing thousands of nozzles which will discharge the water into the air in the form of spray, allowing the action of the air and sunlight to oxidize the objectionable vegetable matter. Both aeration basins will present a very interesting and pleasing view, being set in suitable landscape.

Provision has been made for filtration, should this treatment become desirable, and land has been acquired for this purpose.

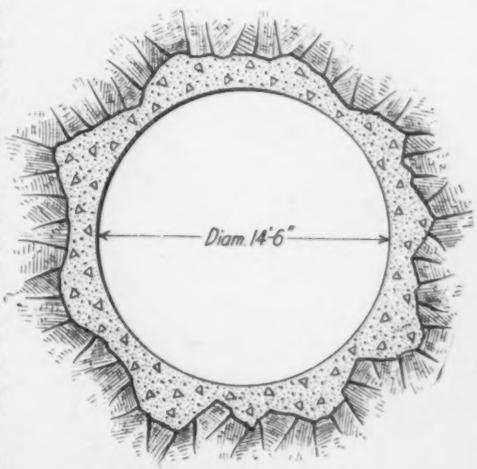
Cement and Concrete.

Permanence has been the watchword in the design for all important parts of the work. Concrete, for reasons of economy, adaptability, strength and durability, has been selected as the construction material. All the advantages which are inherent to concrete for large works are found to apply, and many special advantages are derived in this work. Concrete is the sole material used for the construction of the dams, bridges, cut-and-cover type of aqueduct, for the lining of tunnels and for the lining and covering of steel pipes, etc. In fact, the whole waterway from end to end will be concrete lined.

With concrete, a much smoother interior is obtained in the aqueduct, and therefore a larger capacity for a given size is possible. Superior water-tightness is also secured than through the use of any other construction material. A controlling factor, on account of the remoteness of the work, was that local materials could be utilized



GRADE TUNNEL



PRESSURE TUNNEL

for construction. It is estimated that about 5,000,000 cubic yards of masonry would be used on the work.

On account of the great amount of cement to be used (about 6,500,000 barrels) and the various uses to which it is put, a most exacting inspection and the maintenance of the highest standard is required. Cement, to prove acceptable, must be of some well-known brand which has been in successful use for at least five years, and the manufacturing works must have been in successful operation for at least two years. The process of manufacture is watched by inspectors of the Board of Water Supply through all stages until storage under seal in the mills' bins. Samples from different portions of each bin are tested and analyzed at the laboratory of the board at New York City. All packing and shipping is also done under the supervision of an inspector of the board. Shipment from the mills under seal to the site of the work during the working season has proceeded at the rate of over 200,000 barrels per month. The whole project when completed will be a monument to the concrete art. The brands of cement used on the work are Alpha, Alsen, Atlas, Catskill, Dragon, Edison, Giant, Pennsylvania, Saylors, and Universal. Some typical sections from the contract specifications relating to cement and concrete are given at the end of this article.

For the construction of the Ashokan, Kensico and Hill View reservoirs and the Catskill Aqueduct, 65 formal contracts have been entered into, and for supplies and preliminary work 90 informal contracts and agreements have been made. The expenditure for all of these amounts to about $97,000,000. The payments to date on these contracts and agreements have amounted to about $46,000,000, the monthly payments many times exceeding $2,000,000.

Organization.

The Board of Water Supply consists of three commissioners appointed by the Mayor. Its forces are divided into three bureaus: Administration, Police, and Engineering. In the Administration Bureau are the secretary, auditor, chief clerk and real estate examiner and adjuster, with a force of about 75 employees.

The Police Bureau is in charge of a chief of police, who has a uniformed force of about 400 men who patrol the 100-odd miles of work both day and night. These are a splendid body of men whose influence among the laborers has been made to be felt many times, and who have earned the commendation of the adjoining communities on many occasions.

The Engineering Bureau has charge of the actual construction and is divided into five departments: Headquarters, Reservoir, Northern Aqueduct, Southern Aqueduct, and City Aqueduct. Headquarters Department, with offices, laboratories and storeroom in New York City, has charge of designs, experimental investigations, inspection of construction materials, specifications, contracts, civil service matters, and equipment and supplies. The Reservoir Department has charge of the surveys and construction of reservoirs in the watersheds, beginning with the Ashokan Reservoir. To the Northern Aqueduct Department was given the construction of 60 miles of the aqueduct, beginning at the Ashokan Reservoir and including the crossing under the Hudson River. The Southern Aqueduct Department includes the remainder of the aqueduct (32 miles) to the city line, and the Kensico and Hill View reservoirs. The work in the city, including 34 miles of pressure tunnel and pipe lines and a terminal reservoir on Staten Island, is in charge of the City Aqueduct Department. The offices of the field departments are contiguous to the work and each one has approximately $25,000,000 of work in charge.

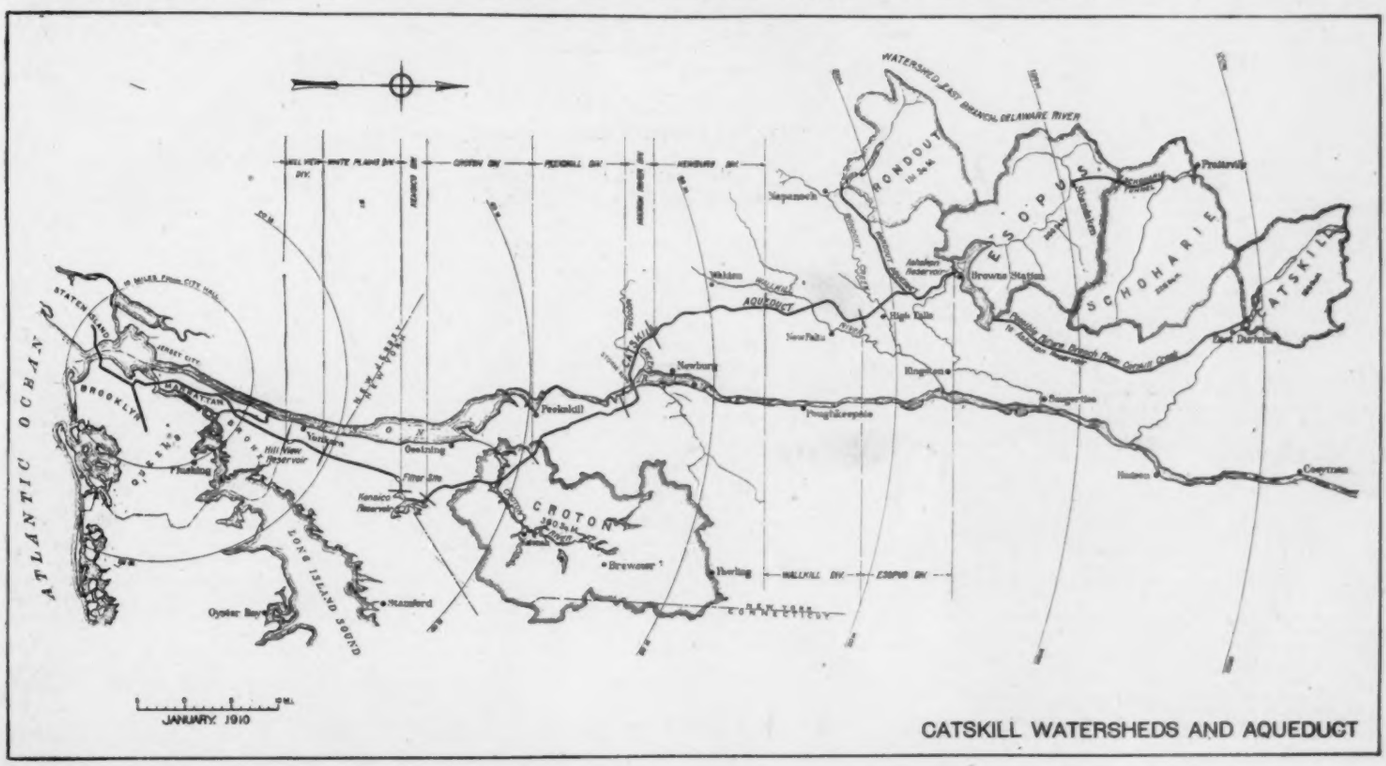
The commissioners are Charles Strauss, president, Charles N. Chadwick and John F. Galvin. The staff in the Engineering Bureau is as follows: J. Waldo Smith, chief engineer; Merritt H. Smith, deputy chief engineer, and department engineers, in order of departments above mentioned, Alfred D. Flinn, Carlton E. Davis, Ralph N. Wheeler, Frank E. Winsor and Walter E. Spear, and Department Engineer Thaddeus Merriman, assistant to the chief engineer. Robert Ridgway was department engineer of the Northern Aqueduct Department from its organization to January 14, 1912. At the height of activity the Engineering Bureau had on its rolls 1,350 employees. Consulting Engineers John R. Freeman, William H. Burr, Frederic P. Stearns and Alfred Noble, and eminent geologists, architects and landscape and sanitary experts advised the board and the chief engineer.

Extracts from Contract Specifications.

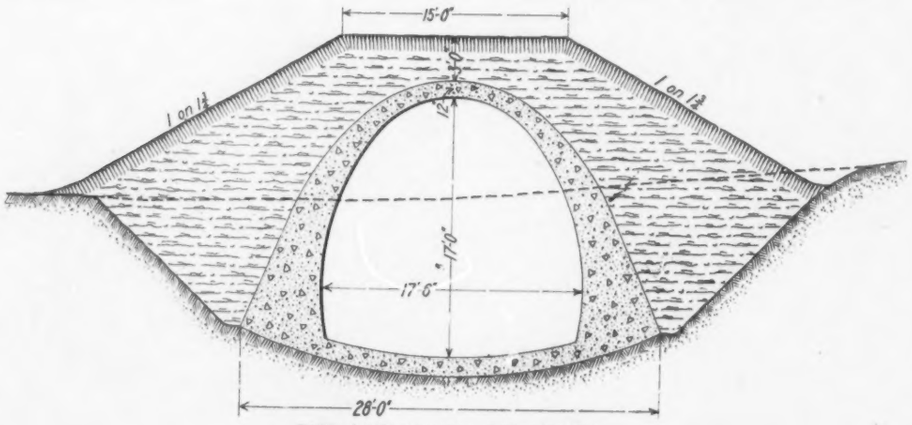
Portland Cement—All cement used in the work shall be true Portland cement of well-known brands which have been in successful use for large engineering works in America for not less than five years, and which are manufactured at works which have been in successful operation for at least two years. The brands shall be acceptable, and before beginning to furnish cement the contractor shall inform the engineer what brands he proposes to use. Unless otherwise permitted, not more than three brands shall be used in the whole work, and only one brand shall be used at the same time in any section of the work, excepting as permitted.

All cement shall be dry, finely ground, and free from lumps, caking or water marks. By Portland cement is meant the finely pulverized product, resulting from the calcination to incipient fusion of a properly proportioned intimate mixture of argillaceous and calcareous materials, to which no addition greater than 3 per cent has been made subsequent to calcination.

The cement shall be delivered in canvas bags or other strong, well-made packages, each plainly marked with the manufacturer's brand. The weights of such packages shall be uniform. Packages received in broken or damaged condition shall be rejected, or accepted only as fractional packages.



CATSKILL WATERSHEDS AND AQUEDUCT



CUT AND COVER AQUEDUCT

The contractor, at the beginning of operations and at all other times while cement is required, shall have at the site of the work an abundant supply of acceptable cement, and shall carefully guard against possible shortage on account of rejection, irregular delivery, or any other cause.

The cement will be subjected to thorough inspection and tests, the method of sampling and the character of the tests to be determined from time to time. In general, tests will conform to the methods recommended by the Committee of the American Society of Civil Engineers on "Uniform Tests of Cement." The contractor shall notify the engineer when cement for this work is to be manufactured and a representative of the board shall have liberty at all times to inspect the materials, process of manufacture and daily laboratory records of analyses and tests at the cement works, and to supervise the packing. Samples will be taken at the place of manufacture by a representative of the board and sent to the board's laboratory, where the testing will be done, unless otherwise directed. An acceptable room, maintained at a proper temperature, shall be provided by the contractor at the place of manufacture, for convenience of the representative in obtaining samples and where preliminary tests may be made, if required. Each package of cement shall be sealed at the expense of the contractor, under the supervision of the representative of the board, with a seal furnished by the board.

Cement may be permitted to be used which shall have passed satisfactorily the tests to be prescribed for fineness, soundness and setting, and 7-day tensile tests, neat and in mortar, in the form of standard briquettes. If any cement proves unsatisfactory on the first tests it shall be subjected to a second set of tests, including 28-day tensile tests.

Cement kept in store several months may be subjected to repeated tests if required. If the tests prove any cement unsatisfactory, which has been delivered at the site of the works, such cement shall be at once plainly marked for identification and promptly removed from the work and its vicinity. If any cement proves unsatisfactory on 28-day tests and portions of it have been used in the masonry, such masonry may be ordered removed and replaced with masonry built of acceptable cement, at the contractor's expense. Cubes, beams or briquettes shall be made at any time for purposes of tests from concrete or mortar being used in the work, if so directed.

Chemical analyses will be made from time to time during the progress of the work. The cement shall contain not more than 1.75 per cent of anhydrous sulphuric acid (SO_3), nor more than 4 per cent of magnesia (MgO).

The cement shall have a specific gravity of not less than 3.10 nor more than 3.25 after being thoroughly dried at a temperature of 212° F., and its color shall be uniform, bluish gray, free from yellow or brown particles, unless advancement in the manufacture of cement during the life of this contract shall have developed acceptable cement having other characteristics.

The fineness of the cement shall be such that not less than 92 per cent will pass a No. 100 sieve and not less than 75 per cent a No. 200 sieve, the openings of the sieves being respectively, 0.0055 and 0.00275 inch square.

The cement shall develop initial set in not less than 30 minutes, unless a more quickly-setting cement is specifically required, and shall develop hard set in not less than 1 hour, nor more than 10 hours.

The requirements for tensile strength for briquettes 1 inch square in minimum section shall be as follows:

NEAT CEMENT.

Age.	Minimum Strength.
24 hours in moist air	200 pounds
7 days (1 day in moist air, 6 days in water)	500 pounds
28 days (1 day in moist air, 27 days in water)	600 pounds

Briquettes of neat cement shall have a strength of not more than 800 pounds at the end of 7 days (1 day in moist air, 6 days in water), and the tests shall show no retrogression in strength at 28 days from those at 7 days.

ONE PART CEMENT, THREE PARTS STANDARD OTTAWA SAND.

Age.	Minimum Strength.
7 days (1 day in moist air, 6 days in water)	170 pounds
28 days (1 day in moist air, 27 days in water)	225 pounds

Mortar briquettes shall show a minimum increase in strength of 20 per cent from the tests at the end of 7 days to those at 28 days.

Tests for soundness may be made in the following manner: Three pats of neat cement or normal consistency about 3 inches in diameter, ½ inch thick at the center and tapering to thin edges, shall be made on clean glass plates and kept in moist air for a period of 24 hours. The pats are then to be treated and observed as follows:

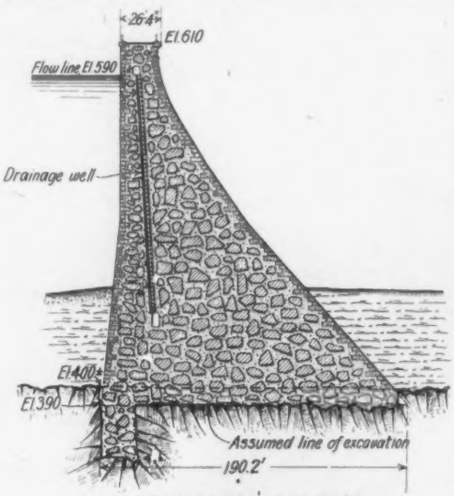
(a) A pat is to be kept in air at normal temperature, and observed at intervals for at least 28 days.

(b) A pat is to be kept in water maintained as near 70° F. as practicable, and observed at intervals for at least 28 days.

(c) A pat is to be placed in water at normal temperature, which is gradually (in about half an hour) raised to boiling temperature and maintained there for 4 hours.

The pats, to pass the requirements satisfactorily, shall remain firm and hard and show no signs of distortion, blotching, checking, cracking or disintegration.

The contractor shall provide several cement storehouses, convenient to the work, at approved places. Cement storehouses shall be weather-tight, shall have tight floors a proper distance above the ground, shall be large enough to admit of keeping on hand a sufficient supply of cement to prevent delays or interruptions to the work for lack of cement, and shall have sufficient floor space for storing each carload of cement separately, and affording convenient access thereto for sampling,



OLIVE BRIDGE DAM
MAXIMUM MASONRY SECTION

counting of packages, and removal. Cement in bags shall not be piled to a height exceeding 7 feet. Suitable accurate scales shall be provided by the contractor for weighing the cement in each storehouse and elsewhere on the work, if required.

The contractor shall notify the engineer when deliveries are to be made, a sufficient time in advance to allow the engineer to have a representative present to sample the cement, and unless this is done, or if additional tests are necessary, the contractor shall rehandle the cement in the storehouse for the purpose of obtaining samples as directed.

The contractor shall employ competent storekeepers who can speak and understand the English language, who shall have charge of the cement storehouses and keep suitable records of the delivery and use of all cement. Copies of these records shall be furnished the engineer at the close of each day's work, showing in such detail as he may reasonably require, the quantity of cement used during the day at each part of the work.

Concrete—Concrete shall be made of cement, and aggregates of the qualities herein specified, in the proportions directed. In general, concrete shall be mixed approximately in the proportions of 1 volume of cement to 8 volumes of aggregates, the aggregates being measured separately by volume in approved receptacles. In measuring the aggregates, proper allowance shall be made for variations due to moisture. In determining the proportions of the ingredients, 105 pounds of cement shall be considered a cubic foot.

The fine aggregates used for concrete and mortar in all parts of the work shall be clean, and shall not contain more than 3 per cent by weight of finely divided vegetable matter. They shall contain both fine and coarse particles, with no grains larger than will pass through a ¼-inch mesh screen, and shall pass the following test as to the proportion of finer particles successfully. Samples of the material proposed for use in mortar or concrete shall be prepared for testing by passing them through a sieve with 8 meshes to the inch made of wire 0.0295 inch in diameter (No. 22 wire gage, Old English Standard). Of the material passing this sieve not more than 12 per cent shall pass a sieve with 100 meshes to the inch, made of wire 0.0045 inch in diameter (No. 40 wire gage, Old English Standard). Sand which does not fulfill the above requirements in its natural condition, may be screened, washed or mixed with other sand to produce sand which will satisfy the above requirements.

Ballast or coarse aggregates for concrete shall consist of fragments of hard, durable, insoluble stone, broken to such sizes as are herein specified; or clean, sound, insoluble gravel. Shaly or "reeding" stone which breaks into slabs or plates, or ballast which is all of one size or approximately so, shall not be used. Ballast shall not contain dust, loam, clay, perishable matter or other improper substances. It shall be washed or screened, or both if necessary, to remove such substances. Ballast for concrete shall, in general, be of such sizes that all of it can be passed through a 2-inch ring and be retained on a ¼-inch mesh screen. Greater maxima sizes of aggregates for ballast, however, may be permitted or required in some parts of the masonry; and in others the maximum size may not be permitted to exceed ¾ inch.

Material, direct from the crusher or bank, may be used in concrete, without washing, screening and subsequent mixing, if it is of uniform character and suitable for the purpose; but "run" of crusher or bank shall not be used unless permitted or ordered, and then only in strict accordance with directions.

Samples of aggregates which the contractor proposes to use shall be submitted to the engineer at least two weeks before the contractor commences to deliver the materials at the site of the work. Materials shall not be delivered until the samples shall have been approved, and as delivered they shall be equal in all respects to the approved samples. Samples of fine aggregates (about one quart) shall be submitted in glass jars with stoppers, and samples of not less than one cubic foot of coarse aggregates shall be submitted in suitable boxes or bags. All samples shall be plainly and neatly labeled, showing the place from which taken, where proposed to be used, and the date and name of collector.

The contractor shall provide suitable means for controlling and accurately measuring the water for mixing concrete.

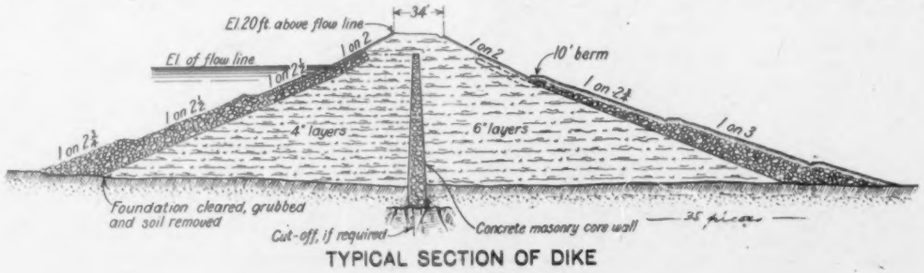
Mortar for bonding masonry to rock or old masonry, for use in setting pipes or other objects in the concrete, for plastering surfaces if ordered or permitted, or for other purposes, shall be made of cement and sand of the qualities herein specified, mixed by hand or machine, in such proportions and in such manner as may be directed.

Concrete shall be mixed in approved mechanical mixers, except that, if permitted, relatively small quantities may be mixed by hand in a satisfactory manner. Acceptable clean water shall be added in sufficient quantity to produce a mixture of the wetness required. Mixing shall be continued until every particle of ballast is covered with mortar. No retempering shall be allowed except by express permission, and all concrete which has its initial set before placing in the work shall be at once discarded and removed. If any concrete is not wet enough when delivered for placing, it shall be sprinkled with a fine spray of water, and reworked to the required consistency.

After mixing and before the initial set has occurred, the concrete shall be deposited in place, in batches not exceeding 1 cubic yard. Provision shall be made for its rapid transportation from the point of mixing to the work. Any concrete which may have become compacted during transportation shall be satisfactorily remixed just before being placed in the forms. Liquid concrete shall be deposited so as to maintain a nearly level surface and avoid flowing along the forms. It shall be continuously and sufficiently juggled to expel air. Stones shall be carefully spaded away from the face. If a plastic mixture is permitted or ordered, it shall be deposited so as to spread out in layers not more than 6 inches thick. Ramming and spading shall be thorough for each layer. In special cases, as where concrete is deposited on slopes, a dryer mixture may be used, but great care shall be exercised to spread such concrete evenly in layers not more than 4 inches in thickness, and to ram it thoroughly. In general, the methods shall be such as to give a compact, dense and impervious concrete. Large, sound, clean stones of suitable sizes may be embedded in the concrete in the manner directed wherever permitted, as in the case of the side walls of the aqueduct, or elsewhere in the larger masses of concrete.

For the proper bonding of new masonry to old, such provision shall be made of steps, dovetails, or other devices as may be prescribed. Whenever new masonry is joined to old, the surface of the old masonry shall be thoroughly cleaned, using stiff brushes and a stream of water, the laitance shall be scraped off and the surface shall be clean and wet at the moment the fresh concrete or mortar is placed. When ordered, a thick wash of rich mortar shall be brushed over the contact surface of the old concrete.

Exposed surfaces of concrete of culverts, retaining-



TYPICAL SECTION OF DIKE

walls, and of any other structures, shall be made with especial care against forms that are especially smooth and true. Such surfaces shall also be rubbed smooth when and as directed, with mortar blocks and water. The finished surface of the invert of the aqueduct, the floors of chambers and the top of copings shall be accurately screened to the required form and floated and troweled smooth by skilled finishers.

Special care shall be taken with the interior surface of the aqueduct and the faces of concrete to be exposed, to secure a smooth surface free from visible stones. If, however, upon removing the forms, molds or centers, any voids or other imperfections be found, such faults shall be corrected at the contractor's expense by filling with mortar or otherwise, as directed, even to the extent of taking down and replacing unsatisfactory concrete.

No plastering of any concrete surfaces shall be done unless expressly permitted, and, if so permitted, shall be done in strict accordance with directions. No payment shall be made for plastering done to correct defective work.

Every precaution shall be taken to prevent concrete from drying until there is no danger of cracking from lack of moisture. At least a part of the earth covering for the aqueduct shall be placed so as to cover the whole outside of the aqueduct as soon after the removal of the outside forms as may be directed. Concrete shall be kept moist for at least two weeks, or until covered with earth.

The contractor shall not permit walking or working over or upon finished surfaces of concrete until it shall have set sufficiently. The contractor will not be allowed to commence the erection of centering and forms for side walls and arch of the aqueduct until such time shall have elapsed after the laying of the invert as may be required, and great care shall be taken at all times to prevent injury to the invert surface.

No concrete or other masonry in mortar shall be deposited under water without explicit permission, and then only in strict accordance with directions. The contractor shall not, without explicit permission, allow water to rise on any masonry until the mortar shall have set at least 24 hours.

Concrete shall not be mixed or deposited in the work in freezing weather without explicit permission. If directed or permitted to build concrete structures in cold weather, required or approved precautions shall be taken for removing ice and frost from the materials, including heating the water and aggregates; for protecting the newly-laid masonry from freezing; and for securing work satisfactory in all respects. Satisfactory covering for the newly-laid masonry and such additional appliances and materials as may be required therefor, including steam pipes for keeping the air warm beneath the said covering shall be provided.

The laying of masonry may be prohibited at any time, when, in the judgment of the engineer, the conditions are unsuitable or the proper precautions are not being taken.

Masonry damaged by freezing or by alternate freezing and thawing, or from any other cause; or any masonry which shall be found defective, at any time before the completion of this contract, shall be removed and replaced or otherwise made good, at the expense of the contractor.

The contractor shall provide all necessary forms, molds and centers for shaping the concrete. They shall be true to the required shapes and sizes, strong enough to withstanding all operations incidental to placing the concrete, and water-tight, and the faces against which the concrete is to be placed shall be satisfactorily smooth and clean. To obtain tightness, calking with oakum or other suitable material may be required, for which the contractor shall provide suitable tools and materials. Small rods to hold the forms will be allowed in the walls, provided proper means be used to take out the 2 inches nearest the surface. All holes left after removal of the rods shall be immediately and completely filled with cement mortar, and the surface left smooth and in good condition. Whenever required, forms shall be thoroughly wet just before placing concrete, so as to prevent injurious drying of the surface of the concrete by absorption.

To secure a perfectly smooth surface on the inside of the aqueduct, the centering, if not entirely of approved metal construction, shall be covered with galvanized sheet steel not less than No. 23 gage, weighing 1.12 pounds per square foot, or other acceptable material. The surfaces of forms for the inner or exposed concrete surfaces shall be cleaned and smeared with soap, mineral oil, or other suitable substance to prevent the adhesion of the concrete. Whenever faces are not cast against forms they shall be screeded, troweled and rubbed to an acceptable finish by men skilled in such work.

If required for test purposes, the contractor shall make cubes, beams, slabs, walls or other shapes of masonry, or shall furnish small quantities of mortar or concrete.

A WELL PLANNED CONCRETE PLANT.

A plant layout which would be very suitable for buildings where about 10,000 cubic yards of concrete are to be placed is that which was employed in building the American Can Company's new reinforced concrete factory located on Beach and Palmer streets, Philadelphia. This building is five stories high with basement, and has over-all dimensions of 346 by 100 feet. The ¾-yard Ransome mixer has turned out 9,200 yards of concrete for this work, at times mixing 290 yards in a trifle less than eleven hours or 25 per cent over normal rating. The plant has been so satisfactory that it has been taken down and is being used in constructing the new West Philadelphia High School, where about 8,000 yards of concrete will be mixed.

One of the features of this plant outside of its economy is the fact that it has been made so simple that it can be taken down and easily erected on another job. The tower is of wood and 100 feet high.

An inspection of the accompanying illustration will make perfectly clear the course the materials follow. The sand and stone, the latter mostly ¾ in., are dumped from wagons onto the platform and raised by a bucket elevator, driven by a 10-horsepower engine, to the sand and stone bins at the top. The stone bin has a capacity of about 48 yards, while the sand bin holds about 20 yards. From this point the aggregate fall by gravity into a proportioning hopper being admitted through gates. The hopper is provided with a partition that can be set according to proportion desired.

Below the proportioning hopper is the fixed batch hopper of the ¾-yard Ransome mixer operated by a 15-horsepower engine that runs the hoist also. The cement is piled in bags alongside of the top of the mixer's hopper and water is turned into the latter from a pipe leading from a marked water barrel connected to the city mains. The concrete is proportioned 1:2:4 and is discharged into a Ransome hoist bucket that is unloaded at the proper point. The contractors on this job are Cramp & Co., of Philadelphia, with F. V. Warren in charge.

SPECIFYING TIME OF REMOVAL OF FORMS

It is safe to say that the majority of failures of reinforced concrete structures has been due to the premature removal of forms. It is not sufficient for an architect or engineer to state that the forms shall not be removed until the concrete has hardened sufficiently to permit of their removal with safety. The time which should elapse before removal should be stated.

Lockwood, Greene & Co., of Boston, architects and engineers for industrial plants, in drawing specifications for reinforced concrete structures, state in very plain terms the time that forms should stay in place, and an idea of just how their specifications read may be obtained from the following extracts from the specifications made for the Aberthaw Construction Company, the concrete contractors on the work in question:

Removal of Forms: Under no consideration shall forms be removed until the concrete has hardened sufficiently to permit of their removal with safety.

Slabs and Beams: Forms shall not be removed from floor and roof slabs in less than seven days. Sides of beams may be removed at the same time as the floor slabs, provided original supports under beams and girders are left in place.

Columns: Where original supports remain under beams and girders coming to columns, the forms shall not be removed from the columns in less than four days.

Supports: The original supports for all beams and girders must remain in place at least ten days, but at beams and girders having more than 30-foot span from center to center of support shall be considered as special cases and subject to inspection of superintendents of construction before removed.

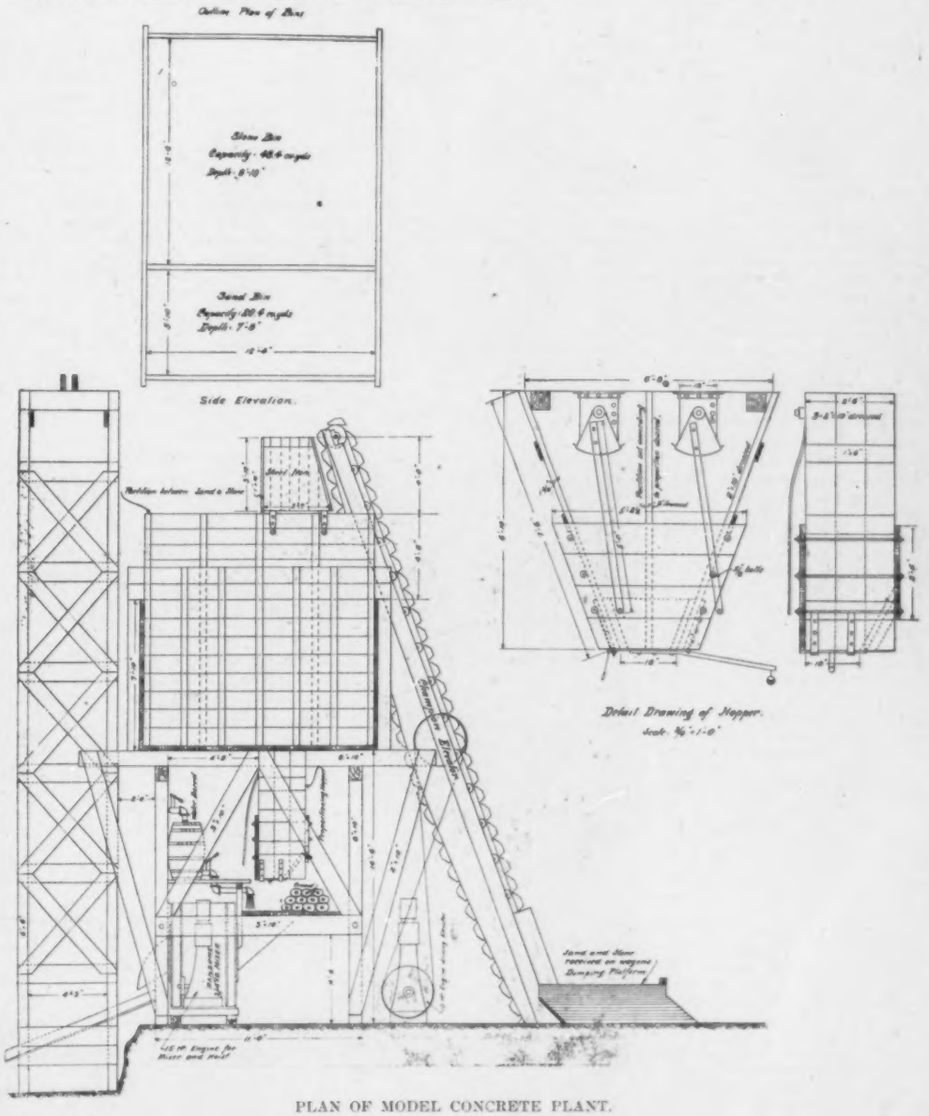
The length of time before removal of forms shall be increased on all cases and additional time allowed for each day the thermometer registers, at any time during the day or night, below 35 degrees Fahrenheit.

A NOVEL CONCRETE TEST.

An original test of reinforced concrete construction is related by Mr. Morton C. Tuttle, of the Aberthaw Construction Company, in a recent paper. It is a test which, unfortunately, conditions prevent, but Mr. Tuttle tells it in these words:

"On Bridge Street, at Lowell, the big storage building of the Massachusetts Cotton Mills rises ten stories above the sidewalk. The building is of reinforced concrete frame, and on this are carried the brick curtain walls. The building is a fine example, not only of thoroughly fireproof construction but of pleasing handling of the exterior.

"It was on the upper floor of this building that one enthusiast stated his willingness to sit on a keg of powder while the rest of Lowell burned up—a test of faith in one's chosen material of which local prejudice has robbed the eager concrete trade."



PLAN OF MODEL CONCRETE PLANT.

CONCRETE PAVING IN EIGHT CITIES

How the Up-to-date Method of Street and Road Improvements Has Been Employed in Many Sections of the Country

From April 17, 1911, the beginning of the present fiscal year, to March 10, 1912, Kansas City laid 46,029 square yards of plain concrete pavement on streets at a cost of $56,559.78, a little less than $1.23 per square yard. During the same period 28,052 square yards of this pavement were laid on alleys at a cost of $38,645.57, or approximately $1.38 per square yard. On streets the total amounted to 3.3 miles, on alleys 3.4 miles. In addition to the above quantities contracts have been awarded during the past winter for concrete pavement on streets to the amount of $79,067.82, at an average price of $1.04 per square yard, but the work has not been completed. With this work in view I believe the coming year will nearly double the amount of concrete pavement laid in 1911. In 1910 scarcely any of this class of pavement was constructed on streets.

The lowest price paid for concrete pavement during 1911 was $1.02 per square yard; the highest price $1.47. Recent contracts have been let for as low as 96 cents per square yard. The price of cement has varied in 1911 from $1.30 to 88 cents per barrel; sand averages $1 per cubic yard delivered, and crushed rock, $1.35. All contracts include the cost of sub-grading and provide for payment in special tax bills issued against the abutting property, which the contractor must dispose of at a discount ranging from 7 per cent to 10 per cent, or carry himself. These tax bills are not issued until after all work has been completed and accepted. All concrete pavement carries a maintenance bond and guarantee for a period of five years.

The first concrete pavement in Kansas City was laid in 1904, on the alley between Forest and Tracy from Fourteenth to Fifteenth streets, a closely built semi-residence and business section, and is in good condition today. Up to 1910, however, only 1.63 miles had been constructed, all on alleys. It was not until the fall of 1910 that any concrete pavement was laid on streets, and this was put down as a temporary expedient on one of the heaviest traffic streets in Kansas City—Sixth street from Broadway to Bluff street, which is about 1,200 feet in length and connects a large wholesale district with the freight and warehouse district. It had been paved with asphalt, but the traffic had increased to such an extent that it was almost impossible to keep the asphalt in repair after the ten-year maintenance period expired in 1909. Condemnation proceedings had also been instituted to widen the street. On the advice of L. R. Ash, city engineer, a "temporary" pavement of plain concrete was laid in November, 1910, because it was the cheapest form of pavement and because it could be used for the foundation of a stone block pavement the following season when the street was widened. The condemnation proceedings have been appealed and delayed so that this concrete pavement is still in use at the present time.

The concrete was 6 to 8 inches thick in one course, of a mixture of 1:2½:4½. It was begun with the expectation that very cold weather might set in any day and was laid consequently in a hurried manner and without expansion joints. The entire surface was covered with manure and left two weeks to harden. During this time the temperature dropped several degrees below freezing every night and the pavement was thrown open to traffic with snow on the ground. At the end of the first month the pavement was in use, the temperature dropped about 50 degrees in a few hours, with a minimum of 10 degrees below zero in the next three days. The temperature rose almost as rapidly as it dropped. When the temperature was at the lowest, transverse cracks appeared at intervals of about 125 feet, but opened only about ⅛ inch. The cracks have given no further trouble. The sudden changes of temperature seemed to soften the surface of the pavement, but no general defects appeared below a surface depth of ¼ inch. Since the pavement has been in use, however, a number of chug-holes have developed. This is due, no doubt, to the poor quality of stone used, a soft limestone, and to the fact that in the hurry of placing the concrete rock pockets occurred. A considerable portion of the surface is in good condition today, after 15 months of the hardest kind of use. The surface has an appearance similar to a terazzo floor, with the rock showing flush with the surface. A census of traffic taken for three days last summer showed an average of 786 motor vehicles and 4,558 horse-drawn vehicles per 24 hours over this street. The horse-drawn vehicles were almost entirely heavy drays. The roadway is 36 feet wide.

I have gone into the circumstances of the construction on this particular street somewhat fully, because it really marks the beginning of the use of one-course, plain concrete pavement in Kansas City. Under adverse circumstances of construction and the most severe treatment from traffic, this particular pavement proved so serviceable that Mr. Ash drew specifications for and recommended its use on residence streets in this city. The soil of Kansas City is a heavy clay which requires the laying of a pavement as soon after grading as possible in order to make the street serviceable. Heretofore most of the residence streets have received asphalt paving, which has proved very good, but high-priced for outlying, newly developed residence districts, the average price being close to $1.90 per square yard. The figures given at the beginning of this article indicate how well the concrete pavement has been received and what a saving to the property owners its use has meant. On through streets which are liable to carry considerable miscellaneous traffic, the pavement is made 8 inches thick, on residence streets 6 inches thick.

The following quotations from the standard specifications describe the methods used in the construction of concrete pavement both on streets and in alleys, except that no expansion joints are required on alleys. The sub-grading, as stated before, is done by the paving contractor.

The sub-grade shall be thoroughly rolled with a steam roller weighing not less than 250 pounds per inch of face. Should such rolling develop any soft or spongy ground the same shall be removed and such excavations and such depressions as may appear shall be refilled with earth or broken rock acceptable to the city engineer and the entire sub-grade be brought to an even and compact surface by rolling or ramming. In all cases the sub-grade shall be acceptable to the city engineer before starting the construction of the pavement and any damage from hauling over it must be repaired before concrete is deposited on it.

In case springs or other conditions are encountered that in the opinion of the city engineer require drainage, the same shall be installed and connected with sewer or other drainage indicated by the city engineer.

All excavated material shall be at the disposal of the contractor.

The broken stone shall be clean, hard limestone, crusher run, but screened from dust and dirt with largest stone of such size as will pass a 1½-inch ring. The stone must be free from dirt or any deleterious matter and must co tain no soft, flat or elongated particles.

The Portland cement concrete shall be composed of 1 volume cement, 2½ parts sand and 4½ parts of broken stone. All measurements to be of loose materials.

Concrete must be mixed by a machine of a type that will insure accurate proportions of the ingredients, and be acceptable to the city engineer.

The materials shall be mixed wet enough to produce a concrete of such consistency that it will flush readily when tamped, but which can be handled without causing a separation of the coarse aggregate from the mortar, and which will not creep toward the curb or sag out of place when deposited and lightly tamped. After the addition of water the mixture shall be handled rapidly to the place of final deposit. Under no circumstances shall concrete be used that has partially hardened.

The concrete must be taken from the machine in such manner as will insure against loss of mortar, and deposited to such depth that when tamped and properly finished the pavement shall have a thickness of 6 inches (on residence streets) and the upper surface shall be true and uniform.

The concrete must be deposited in strips transverse to the roadway, and when interruptions occur of such length as to permit the setting of concrete, the pavement must be finished against a board set vertically and at right angles to the street, so that the depositing of concrete may be resumed without disturbing that already in place.

The pavement shall be finished by thorough hand tamping until the mortar flushes freely to the surface, then lightly tamped with a templet of 2-inch plank, shaped to conform to the curvature of the surface of the finished pavement, and have a length of not less than one-half the width of the roadway, to give a uniform surface, with the slight markings from the templet transverse to the street.

Expansion joints not greater than ½ inch shall be placed transversely to the street and at intervals not exceeding 50 feet. An expansion joint may be put at a place where the laying of the pavement is interrupted, provided it is not closer than 25 feet to another joint.

Care must be taken not to chip the edges of the concrete in removing templets used to make expansion joints.

After the concrete has sufficiently hardened the spaces left for expansion shall be cleaned and then filled with an asphaltic cement or paving pitch to be approved by the city engineer.

During the first four days after placing the concrete shall be kept moist.

At all times during the construction of the pavement nothing must be allowed upon it that will disturb the concrete while setting and the street shall not be thrown open to traffic until the engineer so directs.

The excess of mortar in the 1:2½:4½ mixture is necessary to make the concrete work easily in laying and prevent any tendency to form rock pockets. The practice of finishing the pavement with the

LAYING CONCRETE PAVEMENT AT GREENVILLE, ILL.

2-inch plank templets described in the above specifications has been found unsatisfactory and has been discontinued. At present the surface is obtained by gauging the concrete with shovels to stakes driven at the quarter points and in the center, tamping the concrete with a heavy, wide-base tamp and finally brooming the entire surface with an ordinary street push-broom. This gives a slightly roughened mortar finish to the surface. Care should be taken to get the concrete on each side of the expansion joint at the same level to avoid a bump. The length of time the street is closed to traffic after the concrete has been placed depends on local conditions and the weather, but should be at least two weeks, while every additional day adds materially to the life of the pavement. In other words, to have a good pavement, the concrete must be first class in every particular and anything which makes for proper concrete improves the pavement.

LAYING CONCRETE PAVEMENT AT LIBERTY, MO.

In two cases where the city has paid for the paving in cash, and on several private jobs, the curb and pavement have been constructed combined. The reason this has not been done on city contract paving is on account of certain legal difficulties in issuing a combined tax bill. In construction of this character forms for the back of the curb are set and the pavement laid up to these forms. As soon thereafter as the concrete will permit and before it becomes dry, the front forms for the curbs are placed on it and held in position by clamps and spacers to the rear form. The curb is then constructed. It is necessary to follow with the curb before the pavement is hard set to insure a bond. Of course, a good bond is absolutely essential in this class of work.

Concrete pavement has disadvantages like every other kind of pavement. It is more noisy than macadam, more dusty than asphalt, the surface may bleach out white in the sun and be hard on the eyes; there is liable to be difficulty with the expansion joints, and under heavy traffic the abrasive wear is appreciable. Where its use is restricted to residence streets, highways and other light traffic streets I believe the one-course plain concrete is absolutely the most economical pavement to use. It can be laid two or three inches below the established grade and used later as a foundation for a sheet asphalt, bitulithic, brick, or any other kind of pavement. It is cheap and durable; affords good footing for horses; is not slippery in wet weather; can be used on steep grades with a slightly roughened surface; is a clean pavement, and can be easily laid and repaired by unskilled labor without plant installation. This last advantage alone should recommend it strongly to small cities. Kansas City's experience has been very satisfactory.

CONCRETE PAVING IN MARSHALLTOWN.

By W. H. Steiner, City Engineer.

Concrete paving in Marshalltown, Ia., does not differ materially from that laid in other cities, except as to the expansion joints. The base consists of five inches of concrete composed of one part cement, three parts sand and five parts gravel. The aggregate is pumped from the river and run over a ¼-inch screen to separate the sand and stone. As soon as the base has been laid it is covered with a 2-inch wearing surface composed of one part cement to two parts sand. This surface is not scored in any way, but is slightly roughened with a broom.

Expansion joints are placed next to the curb (we do not have the combined curb and gutter) in the center of the pavement parallel to the curb, and across the street at 15-foot intervals. Most of the paving is 30 feet wide, and we thus obtain blocks 15 feet square. The expansion joints next to the curbs are ¾ inch in width, filled with an asphaltic filler; that down the center of the street is ¼ inch in width, as are the transverse joints, and both are filled with ruberoid or any good tar paper.

The contractor lays one side of the street for a block, or more if he deems necessary, placing the paper at the transverse expansion joints as he goes. This paper is cut a little more than 7 inches in width in order to have it project above the pavement. After the pavement is hard enough to be walked on, a man cuts off the extra paper with a sharp shovel, leaving it level with th epavement. The top of the paper placed in the expansion joint down the center of the pavement is placed even with the top of the pavement and is held in position sharp shovel, leaving it level with the pavement. already laid. After this side has been completed the contractor proceeds with the other side of the street.

So far as I know this method of laying is not used in any other city. Whether it is more successful than other methods remains to be seen, but it was used in laying some pavement in 1910, and as yet only two very small cracks have appeared, and these show no signs of wear. The same method was employed in pavement laid last fall, and we expect to put down some more of it this year.

Many engineers object to having an expansion joint along the center of the street, but most of the concrete paving which I have seen that did not have this joint had cracked more or less in a zigzag line down the center of the pavement, which cracks. however, show little wear, as the traffic is more on either side of the street than in the center. These longitudinal cracks which appear of their own accord are more or less unsightly and vary greatly in width, and when seen by the public cause them to condemn the pavement. Moreover, by placing a joint in the center it has a tendency to check any transverse cracks when they reach the center of the pavement. Also, if the pavement is found defective in any way a 15-foot block can be taken out without in any way affecting the rest of the pavement.

I believe more cracks will appear in pavements laid during the hot months than in those laid in the spring or fall, but I believe the most important secret of success of concrete paving is in the expansion or contraction joints.

LAYING IN FREEZING WEATHER.

By E. H. Collins, City Engineer,, Liberty, Mo.

Contracts were let by the city of Liberty, Mo., in July, 1911, for about 17,000 square yards of concrete paving, extending along about one mile of street and including two miles of curbing. The contract price for the paving, including grading and all other work and material, was $1.18 per square yard. The concrete curb cost 38 cents per lineal foot. The contractor, J. T. Carr, of Liberty, used a machine mixer for both base and wearing surface concrete. All curbing was set before any grading was done, and for this reason and because of the very wet weather, it was October before work was actually started on the paving itself. The contract called for the pavement to be finished on or before November 15, but freezing weather set in unusually early, and on the first of November there still remained to be placed about 1,200 feet of street, or 4,000 square yards of pavement. It seemed very desirable to clean up the street, and consequently concrete was placed whenever opportunity offered and it was not too cold, one-half pound of salt to the barrel of cement being placed in the wearing surface mortar, and the day's work being covered each evening with bedding straw and litter from livery barns. The sub-grade was also kept covered with the same kind of material to keep it from freezing, this material being removed immediately ahead of the concrete and the ground swept clean. The delay caused by these precautions was such that, while 180 to 200 lineal feet of street per day had been laid prior to November 1, this 1,200 feet was not finished until December 20.

In order to test the effect of freezing on this construction, the writer had some forms made 8 by 12 by 6 inches deep, which were filled with concrete, and these blocks left on the street until it was opened for traffic, and although the mercury went down nearly to zero during some of the nights following the placing of the concrete, these samples showed up as strong as samples taken in October, the salt and manure apparently having saved the concrete, and at this date the pavement gives no evidence of weak spots and not a crack can be found, although we have just passed through the most severe winter we have had in 20 years. In the future, however, we do not propose to take any long chances, but will make an effort to have all street work finished by the last of October.

The pavement was constructed as follows: The sub-grade was thoroughly rolled with a heavy roller to a compact surface and a 5-inch concrete base placed thereon, composed of one part Portland cement, 2½ parts sand and 5 parts broken stone, or one part cement, 2 parts sand and 5 parts coarse Joplin grit, "with sufficient water to make a concrete of such consistency that when rammed the mass will not shake, but will, when struck, compact within the area of the face of the hammer without displacing the material laterally." This concrete was rammed until free moisture appeared on the surface, and a wearing surface was immediately placed consisting of one inch of mortar composed of one part cement and two parts sand. This wearing surface was steel-troweled and finished with a wood float, and before it had hardened was brushed with a stiff brush or broom where the engineer directed. The pavement was left in a finished condition every evening, even if the finishers had to work overtime.

Two classes of joints, known as contraction and expansion joints, were employed. Expansion joints ¾-inch wide were made next to each curb; also an expansion joint ½-inch wide was made every 50 feet across the pavement. These were all filled with bituminous cement. Contraction joints are transverse joints placed midway between the transverse expansion joints and are approximately ⅛-inch in width. The edges of all expansion and contraction joints were rounded to a radius of about ½-inch, and extreme care was exercised in removing templates to prevent disturbing any of the concrete after it had taken its initial set.

After the wearing surface had taken its initial set, sand, straw or hay was spread over the pavement and kept moist for several days, after which it was allowed to lie without wetting for a week or more. No traffic was allowed on any pavement within 21 days of the time it was laid, as the writer believes that one of the causes of the failure of concrete pavement—when it does fail—is that it was opened to the public before the concrete was properly seasoned.

We probably have not the ideal contraction or expansion joint, but I believe we are approaching it. It seems quite reasonable to think that if your strongest construction is at the point you place your weak planes, you are eliminating the raveling process, and by properly placing the weak planes

you eliminate to a great extent the cracking from contraction. If I had a street over 36 feet wide I would make the wearing surface 2 inches thick up to 45 feet wide, and for greater width I would thicken the base as well as retaining the 2-inch top. I wish to give credit to F. P. Wilson, city engineer of Mason City, Ia., for several of the ideas embodied in this construction.

BOZEMAN'S CONCRETE PAVMENTS.

By Carl C. Widener, City Engineer.

The first concrete pavement in Bozeman, Mont., was laid in 1908. Bids were opened July 2 of that year and a prominent construction company of Salt Lake City, Utah, was found to be the lowest bidder and the contract was awarded at the following prices: For excavation, 50 cents per cubic yard; for gravel fill, $1.25 per cubic yard; for concrete pavement (not including excavation or gravel fill), $1.95 per square yard.

The principal points in the construction of the pavement were these: The street was excavated and rolled with a 10-ton roller, 3 inches of fine gravel was then placed on the rolled surface. The forms were then set. These consisted of 2x7 inch plank set with the top at grade and running across the street from curb to curb where there was no street railway track. Along the street railway track one side was constructed at a time. These forms were set 10 feet apart and steel headers set 10 feet apart between the forms, making blocks 10 feet square. The foundation was then guaged to 7 inches below grade and 5½ inches of concrete placed in every alternate space and well tamped. This concrete consisted of 1 part Portland cement and 6 parts of natural gravel where the sand was found to be in the right proportion. The gravel was limited to 2 inches in diameter. Before the concrete had set the top coat, 1½ inches thick, was placed thereon and troweled into the concrete. This top coat consisted of 1 part cement, 1 part crushed boulders or pea gravel and 1 part sand, the crushed stone or pea gravel being limited to ½-inch in diameter and the sand very coarse.

The wearing surface was marked off into squares about 4x10 inches, with grooves about ¾-inch deep, made by using a plank shod with iron. The surface was then brushed and left quite rough. The grooves, 4 inches apart, run across the street at right angles to the curb and the grooves 10 inches apart are parallel with the curb. Expansion joints were run across the street every 100 feet and also along the curb.

The length of the street paved was 3,495 feet, amounting to 25,781 square yards. The total cost of the pavement, including all items, was $2.28 per square yard; cement costing about $2.40 per barrel, sand and gravel costing $2 and $1.25, respectively, labor at $2.50 per day of eight hours and using machine mixers. (From report of C. M. Thorpe, Bozeman.)

CONCRETE PAVEMENT IN BOZEMAN, MONT., LAID IN 1908.

As it has now been a little over three years since this pavement was laid, one can gather a pretty fair idea where the methods of construction might be improved upon.

At the places where the steel headers were used, running parallel with the street, considerable wear has been in evidence. Last season the contractors, under their 5-year guarantee, chipped these grooves out of practically the whole length of the street and filled them with a rich mixture of sand and cement. This seems to be holding up pretty well, but has hardly been in long enough for a fair test as yet. Also where the forms were used, running across the street, considerable wear is in evidence, but hardly enough to warrant any repairs at the present time, and not nearly so bad as the grooves running parallel with the street. This is accounted for by the fact that the heavy traffic in passing along the street would get the edge of one wheel in a longitudinal groove and cause a continual grind on the edge of the groove, and it was not a great while until the groove was, in places, wide enough to admit of the width of a wagon wheel.

The grooves in the wearing surface have also shown some signs of wear, but not any more than could be expected.

In some places the pavement seems to have sunk an inch or more and this but calls to mind the extreme necessity of having a firm foundation for all concrete work, and if necessary a system of underdrainage.

In 1910 another block of concrete pavement was laid adjoining the first pavement. This block consisted of 2,915.3 square yards, and was constructed by the same company as the above at the following contract prices: Excavation, 50 cents per cubic yard; gravel fill, $1.50 per cubic yard; concrete pavement, $2.05 per square yard.

The thickness and mixture of both the bottom and top coats of this block were the same as for the first pavement, but a different method of construction was used. The excavation and gravel fill were made the same as the above, a 10-ton roller being used to secure a firm foundation. No forms or headers were used except where expansion joints were to be placed and the expansion joints were placed 60 feet apart running across the street at right angles to the curb line.

The engineers set stakes to grade about 10 feet apart over the whole area to be paved and the contractors worked to these stakes, which were pulled out as the top coat was put on. A day's work consisted of laying the pavement between the expansion joints and work was not stopped at night until this had been done. This method gave a continuous pavement between the expansion joints, which is the result sought for in all concrete work.

The top coat or finished surface was not marked or increased in any way, simply a very rough broom finish being used.

As this pavement has been in but a year and has not been subjected to very much traffic as yet, it is hardly fair to make criticism at this time. It is situated, however, between the Milwaukeee and Northern Pacific freight depots and in the course of the next two or three years will be given as hard a test as necessary to prove its value.

Were I to draw up plans and specifications for another concrete pavement, I believe I would proceed as follows:

Bottom coat, five and one-half inches thick, 1:2:4 mixture. Top coat, one and one-half inches thick, 1:1:1 mixture. The gravel or crushed stone in the bottom coat would be limited to two inches in diameter and in the top coat to one-half inch in diameter. I would place an expansion joint along the edge of the pavement and would place three-quarter-inch expansion joints every 60 feet transversely of the pavement. Then I would specify that the work between expansion joints should be pushed to completion without cessation.

For the finished surface I would specify a very rough broom finish, except that where the street was very steep I would allow marking. However, I do not regard concrete as slippery as asphalt pavement and would hesitate before allowing it to be marked at all.

At the end of the pavement a separate shoulder or curb should be constructed capable of being removed when the pavement is to be continued. This shoulder should have at least a 4-inch radius and with a 6-inch radius would be better.

If the finished surface is to be marked or creased I believe if the grooves were run at an angle of 45 degrees with the curb it might prevent the possibility of wearing into ruts.

CONCRETE PAVING IN BEMIDJI.

By W. M. Everts, City Engineer.

The city of Bemidji, Minn., has twelve blocks of paved street, all of concrete, which has been constructed during the years of 1910 and 1911. In 1910 two blocks were paved in one contract at a cost of $1.20 per square yard, and in 1911 ten additional blocks were let at 90 cents per square yard, the difference in cost being largely due to the change in specifications.

The pavements laid in 1910 were constructed as follows: The soil, which is sandy, was graded and thoroughly wet down, after which a base was laid consisting of five parts of clean, coarse gravel and one part of cement, this being made 5 inches thick and lightly tamped and leveled off so that the surface was parallel to that of the completed street. Immediately after this the wearing surface was placed, this consisting of two parts of sand (screened from the gravel) to one part cement, made into a very wet mixture and given a thickness of 1½ inches. The screenings resulting from this sand were thrown back into the gravel, and this resulted in an almost perfect mixture for the concrete. The wearing surface was leveled off with a straight edge, made slightly oval to conform to the completed surface of the street, floated with a wooden float and troweled with a long-handled steel trowel. When partly set it was roughened with an ordinary stiff broom, which left the surface slightly rough and quite satisfactory.

In this pavement one block 18 by 25 feet was laid in a different way as an experiment in a place where it would receive the heaviest wear from traffic. This square appears to be in as good condition as any of the pavement in regard to wear and cracks, and is more satisfactory in that it is rougher and horses are not nearly so apt to slip on it. For this reason, and also because it apparently would be cheaper to lay, the ten blocks laid in 1911 were constructed in accordance with this method rather than that employed for most of the 1910 pavement. This method was as follows: On the sub-base, prepared as in 1910, was laid 5 inches of concrete consisting of three and one-half parts of gravel and one part of cement, this being mixed so that it would run, or a fairly "sloppy" mixture, but not sufficiently so to cause water to form at the gutter and run off, carrying the cement with it. As soon as this concrete was placed it was leveled off with a straight-edge to the desired completed surface of the street, floated with a wooden float and troweled with a long-handled steel trowel, all stones more than a half inch in diameter which were near the surface being raked out. After the concrete had partly set it was roughened with an ordinary stiff broom or a wooden float. As stated above, this pavement was laid at 90 cents per square yard (for the concrete alone), as against $1.20 for the two-layer pavements.

All of the concrete pavement in Bemidji has been laid in blocks, following the same general rule. The street is divided longitudinally into three sections or strips, with an 18-foot strip along each curb and a 16-foot strip in the center. There are several advantages in laying the pavement in three sections, one of the principal reasons in Bemidji being because a street car line is to be built in the center of the street, and this construction permits taking up the central strip of concrete without any injury to the side strips. Another advantage is that during construction traffic can continue to use the central part of the street, materials can be hauled over this part, etc., while the two side strips are being constructed. Then, when these have sufficiently hardened, they can be used for traffic and construction while the central strip is being laid.

A three-quarter inch expansion joint was placed along each curb, which was filled with paving pitch. Expansion joints were placed every 25 feet at right angles to the line of the street, these being not more than a half inch wide. The joints between the side strips and central strip were not properly expansion joints, but the edges of the side strips were painted with paving pitch before placing the central strip.

The gravel used in these pavements cost $1.50 per cubic yard and labor $2.25 per day. The cement cost $2.20 per barrel in 1910 and $1.80 in 1911. Conditions in Bemidji are exceptionally favorable for

CONCRETE PAVEMENT AT BEMIDJI.

the laying of cement pavements, as we have a sandy soil and the very best aggregate for the mixture. In cities having a clay soil the cost would probably be increased 25 to 50 per cent. A poor quality of sand or gravel is more liable to cause failure of the pavement than poor cement.

The 1911 pavement was laid in the fall, and has not been down sufficiently long to demonstrate its wearing qualities, but the sample square laid in this way in 1910 is in good condition. In the rest of the 1910 pavement only two or three small cracks have appeared, and these are scarcely noticeable and certainly do no damage whatever to the pavement.

CONCRETE PAVEMENT IN SIOUX CITY.

By Keyes C. Gaynor, City Engineer.

During the year of 1911 the city of Sioux City, Iowa, laid approximately four miles of concrete pavements on streets varying in width from 24 to 52 feet.

The construction of this pavement differed from that of many other concrete pavements in several important particulars, the points of greatest difference perhaps being that the pavement was made all in one mix and only five inches thick. It must be kept in mind, however, that these pavements were laid on streets where the traffic was light.

The specifications were as follows:

SUB-GRADE.

The street shall be graded down to a true crown as per plan of and stakes set by the city engineer. The ground after being dressed shall be thoroughly stamped with an 80-pound tamper, or rolled with a steam roller of not less than 10 tons, as may be required by the city engineer. All hollow places or other imperfections over or in trenches to be broken down and thoroughly consolidated with earth by tamping, or as otherwise directed, so that in the future maintenance difficulties therewith will be avoided. No allowance will be made for such defects. All soft or spongy material, whenever required, shall be replaced with gravel or broken stone at the contract price per cubic yard for such material. No earth shall be removed in preparation of the sub-grade below the base of the foundation, and any earth taken out below such line may be required to be replaced with gravel or broken stone, without extra pay. In all places wherein a filling is required to bring the bed to the required height it shall be done in layers not to exceed 6 inches in depth and thoroughly rolled to insure a solid bed. No allowance whatever will be made for any earth placed in embankment upon or removed from the street being paved. The contractor is to dispose of the extra dirt. The entire grading is to be included in the price per square yard for pavement.

PAVEMENT.

Upon the sub-grade, prepared in accordance with these specifications, shall be laid the concrete pavement 5 inches in thickness after being compacted. The pavement to be mixed and laid as hereinafter stated.

MATERIAL.

The cement shall meet the requirements of the standard specifications for Portland cement of the American Society of Civil Engineers and the American Society for Testing Materials, except that the briquettes mixed 1 cement and 3 of sand shall show a tensile strength of at least 240 pounds per square inch in seven days.

Fine aggregates shall consist of sand, crushed stone or gravel screenings, graded from fine to coarse, passing when dry a screen having ¼-inch diameter holes, shall be preferably of silicious materials, clean, coarse, free from loam, vegetable or other deleterious matter, and not more than 3 per cent shall pass a sieve having 100 meshes per linear inch. Bidders are required to submit a sample of the sand they propose to use with their bids.

Coarse aggregates shall consist of inert material, graded in size, such as crushed jasper, granite or gravel, which is retained on a screen having ¼-inch diameter holes, shall be clean, hard, durable and free from deleterious matter. Aggregates containing soft, flat or elongated particles shall be excluded.

The maximum size of the coarse aggregate shall not exceed that which will pass a 1½-inch ring.

All water used shall be supplied by the Water Department of the city and shall be furnished free to the contractor under the directions of the Water Department. All water used for mixing or otherwise shall be clean, free from oil, acid, strong alkalies or vegetable matter.

EXPANSION JOINT FILLER.

The expansion joint filler shall be a suitable elastic, waterproof compound that will not become soft and run out in hot weather or hard and brittle and chip out in cold weather.

FORMS.

Forms shall be free from warp and of sufficient strength to resist springing out of shape. All mortar and dirt shall be removed from forms that have been previously used.

The forms shall be well staked to the established lines and grades.

All forms shall be wetted thoroughly before any materials are deposited against them.

EXPANSION JOINTS.

Expansion joints ½-inch wide shall be placed across the street every 25 feet along the street and between the curbs or edges of the gutters and the pavement. All boards for expansion joints shall be made in the form of a template, cut to the desired shape of the street, according to plans for detail of each street, and shall not project above the finished pavement.

MIXTURE.

The concrete for the base shall be so proportioned that the cement shall overfill the voids in the fine aggregate by at least 5 per cent and the mortar shall overfill the voids in the coarse aggregate by at least 10 per cent. The proportions shall not exceed 1 part cement to 7½ parts fine and coarse aggregates.

When the voids are not determined the concrete shall have the proportions of 1 part cement, 3 parts fine aggregate and 4½ parts coarse aggregate.

The method of measuring the materials for the concrete, including water, shall be one which will insure separate uniform proportions at all times. The right is reserved to require measuring boxes of a type approved by the city engineer. A bag of cement shall be considered to have a volume of 1 cubic foot, subject to measurement if so desired by the city engineer.

The ingredients of the concrete shall be thoroughly mixed dry, sufficient water added to obtain the desired consistency, and the mixing continued until the materials are uniformly distributed and the mass is uniform in color and homogeneous.

When the conditions will permit, a machine mixer of a type which insures the uniform proportioning of the materials throughout the mass shall be used.

When it is necessary to mix by hand the mixing shall be done on a water-tight platform and the materials shall be turned until they are homogeneous in appearance and color.

The materials shall be mixed wet through to produce a concrete of the consistency that will flush readily under light tamping, but which can be handled without causing a separation of the coarse aggregate from the mortar and which will not creep toward the curb or sag out of place when deposited and lightly tamped.

Retempering—that is, remixing with more water, mortar or concrete that has partially hardened—will not be permitted.

The concrete shall be deposited in strips extending the full width of the area paved. After the addition of water the mixture shall be handled rapidly to the place of final deposit. Under no circumstances shall concrete be used that has partly hardened.

Concrete shall not be mixed or deposited when the temperature is below freezing, and shall be protected against frost until thoroughly hardened. Concrete shall not be mixed or deposited when the temperature is too high, and all work shall be covered as directed by the city engineer.

Workmen shall not be permitted to walk on freshly laid concrete, and where sand and dust collect on the base it shall be removed carefully before the wearing surface is applied. A practical skilled workman shall do the spreading of the concrete and the finishing of the surface.

WEARING SURFACE.

After the concrete is deposited it shall be tamped as directed by the city engineer and his inspector on the job. After the tamping, dry mixture, mixed 1 part cement and 1 part fine aggregate, is to be spread over the surface in sufficient quantity to take up the surplus moisture. The surface must be then floated to true grade. If the concrete has not been graded to get a surface sufficiently true it shall be brought to a true surface by a mixture of 1 part cement and 1½ parts coarse sand before the dry mixture is applied.

The wearing surface shall be spread on the base immediately after mixing, and in no case shall more than 50 minutes elapse between the time that the concrete for the base is mixed and the time the wearing surface is floated.

The wearing surface shall be finished with a wood float, and before it has completely hardened it shall be roughened by brushing with a stiff vegetable fibre brush or broom.

When the surface is to be corrugated the grooves shall be approximately three-eighths of an inch deep and one-fourth of an inch wide, with the edges neatly rounded to prevent chipping or spalling. The grooves shall be perpendicular to the axis of the street, and be approximately 6 inches, center to center. After grooving the surface shall be roughened by brushing as above specified.

PROTECTION.

When complete the pavement shall be well sprinkled with water for a period of at least three days, and shall not be thrown open to traffic until the engineer so directs, and shall be covered with 1 inch of yellow clay, if so directed by the city engineer.

In laying the pavement, work shall be started at the bottom of a grade and carried up.

Some points in the specifications are especially worthy of note. The method of preparing the sub-grade contains nothing new for this locality, but it might be pointed out that it would not be well to follow that system where the ground would heave under frost action.

A peculiar characteristic of the soil in Sioux City is that it does not heave under the action of the frost. Houses can be built with their foundations on top of the ground and not be disturbed by the coldest winters. Therefore it is not necessary to use any sub-drains or give the sub-grade any further treatment than a thorough rolling wherever ditches exist or a fill is made.

During this past winter the thermometer has gone as low as 35 below zero, but the pavement shows no ill effects therefrom. Owing to this fact it is apparent that it is necessary to make the pavement only thick enough to have sufficient body to withstand the pounding. The use of only a 5-inch pavement might be open to criticism in some instances, but under the existing condition in Sioux City it has given very good results.

The 7-day sand test of 240 pounds may seem high, but De Mars sand is used instead of standard Ottawa sand and no difficulty is experienced by the cement people in meeting the requirements.

Another special feature is the stone. Although gravel was admitted in the specifications, only the Sioux Falls jasper was used, and it was owing to the fact that this kind of stone, which is very hard, was obtainable that a one-course or one-mix pavement was possible.

As perhaps with all concrete pavements, the expansion joints gave the most trouble. The expansion joint is the keynote of a concrete pavement. Considerable experimenting was done with tar paper contraction joints and contraction joints without tar paper; the purpose being to insert a joint or drying crack between the larger expansion joints in order to make fewer large joints, but the experiments were not very successful.

The proposition is simply this: Expansion joints are the very weakest part of the pavement, consequently they ought to be put as far apart as possible. Just how far apart is questionable. If the joints are too far apart the pavement will crack in between them. Such cracks may be seen at Windsor, Ontario, but as yet they do not seem to have done any particular damage. However, they look bad and are a reflection on the pavement and ought to be avoided if possible. In the four miles of pavement laid last year in Sioux City there is only one crack, and that one came almost before the cement had set and where an expansion joint should have been.

The joints, generally speaking, were placed 22½ feet apart along the street and with two exceptions no joints were placed parallel with the street except along the curbs. Joints parallel with the street, when they are traveled over, break off and wear down.

The forms at the expansion joints were allowed to stick up above the surface of the pavement, which made it very difficult to keep both sides of the joints at the same elevation. It is very important, however, that this be done, because if one side of a joint is the least bit higher than the other, both sides wear down.

The edges of the expansion joints were made with a special tool and after the workmen became used to the work the joints were fairly satisfactory. It will require several years' use, however, before one can say that such a joint is thoroughly satisfactory. Wooden boards were used for forms. They came out fairly well after the men found out how to handle them, but they were not at all satisfactory.

It is quite possible that some metal joint, like the Baker joint, which is used in Wayne County, Mich., will prove to be better than a plain concrete joint.

The section of the specifications dealing with the wearing surface might be a little misleading without some explanation. In order to use a one-mix pavement and still be able to get a smooth pavement, it required a little special treatment. The writer designed a special tamper, shown in the illustration, the purpose being to drive the stone down from the surface and bring the mortar to the top. In this way a top was secured which could be worked with the wooden floats and a good surface secured. As a matter of fact the tamping brought so much soft material to the top that it required considerable dry mixture to take up the surplus moisture. As a result of the tamping and dry mixture a top was secured which showed practically no stone. The surface was finished with a wood float.

Corrugations at right angles to the direction of the street were put at intervals of six inches on grades greater than 7 per cent. The marks were made with an ordinary sidewalk jointer and were not particularly satisfactory on account of the fact that the line was too narrow.

It was never found necessary to cover a street, but care had to be taken on hot days not to begin the sprinkling too soon after the pavement had been laid.

Concrete pavements have been laid in alleys in Sioux City for several years and have proven very satisfactory indeed. The chief points of failure have been lack of expansion joints, giving "lightning" cracks and an improper surface, although there has been little trouble with the surface where no top coat was used.

In conclusion: The above described pavement has been laid on a soil which will not heave, on streets where the traffic is light and with a stone which is very hard. In another city where the soil heaves it would probably be better to use a thicker pavement and perhaps make other provisions. If only a soft stone is available it would probably be better to use a two-mix pavement. In other words, the kind of a concrete pavement to lay in any given place depends upon certain conditions of that place and on the materials available.

Contracts have recently been let for three miles

of concrete pavement on a street where the traffic is very much heavier than on the streets paved last year. On account of the heavy traffic the mixture has been changed to one part cement, two parts sand and three parts stone.

BITUMEN SURFACING FOR CONCRETE.

By C. H. Vinal, City Engineer, Appleton, Wis.

The city of Appleton, Wis., began laying concrete pavements in 1908, and has laid some each year since then, and all are giving good satisfaction. This material and asphalt are used on the residence streets, while the main streets are paved with either creosoted wood block, brick or sandstone. The alleys are paved with what is known as No. 2 concrete, and there is also a residence street seven blocks long paved with the same material. This last was laid in 1908, and a part of it surfaced with common gas house tar. This was done largely in the way of an experiment, but good results were obtained even with this treatment. We have a number of concrete pavements which have been laid one, two and three years, some having their surfaces treated with bitumen and some not, and all are giving the best of satisfaction.

The bitumen treated pavements are not as noisy or dusty as the others, and this treatment protects the concrete, and I am of the opinion that it is best to use the bitumen surfacing. The life of this surfacing is about three years under ordinary traffic. It should be renewed when worn away, but the cost of this is very small. In experimenting to find the best material for this surfacing I have used raw gas house tar, distilled tar, tar and asphalt mixed, asphalt and oil mixed, and asphalt alone; all with good results. I believe that concrete pavements laid under proper specifications and faithfully inspected will give any city its money's worth in comparison with any other pavement, even in cold countries where the range of temperature is 130 degrees or more.

Our pavements have been constructed in the following way: After the sub-grade has been rolled it is covered with two inches of sand and cinders mixed in equal proportions, and these are wet down and rolled or tamped. The mixture for the No. 2 concrete pavement consists of 1¾ barrels of Portland cement, 1½ yards of clean, sharp sand and one yard of crusher run of limestone with the dust removed. The concrete is laid to a thickness of seven inches and the top flushed to a smooth surface and broomed with a coarse broom crosswise of the street or alley. Three-fourths-inch transverse expansion joints are placed every 40 feet, longitudinal ones extend along each curb, and similar joints are placed along marginal curbs, around all manholes or other fixtures. These joints are filled to within ½ inch of the top with pioneer asphalt, or other equally as good, poured at a temperature of not less than 300 degrees, and the remaining ½ inch is filled with sand or fine stone chips.

In the No. 1 pavements the base is made as for No. 2, but 5 inches thick, and on this is placed a 1¾-inch wearing surface composed of one part cement and 1½ of crushed limestone, trap or granite from which all dust has been removed, the kind of stone depending upon the nature of the traffic to be carried. This surface stone is graded as nearly as possible so that 40 per cent shall be ¼-inch size, 20 per cent ¼-inch size, 15 per cent 1/16-inch size and the remaining 25 per cent sand. This material and the cement are mixed together dry and are then wet and placed on the concrete base and worked or floated to the proper surface. This surface is then roughened by drawing a tool similar to a garden rake both crosswise and lengthwise of the street so as to cut the surface into squares about 2½ inches in size, the scorings being about ½ inch deep.

When the surface has dried it is covered with a skim coat of asphaltic cement, which has been heated to a temperature of at least 300 degrees, and is spread evenly over the surface by the use of mops, brooms or squeegees. This asphaltic coat averages about ⅛-inch thick. On this is spread evenly a dressing of fine stone chips heated to a temperature of at least 250 degrees, enough chips being used to cover the entire surface.

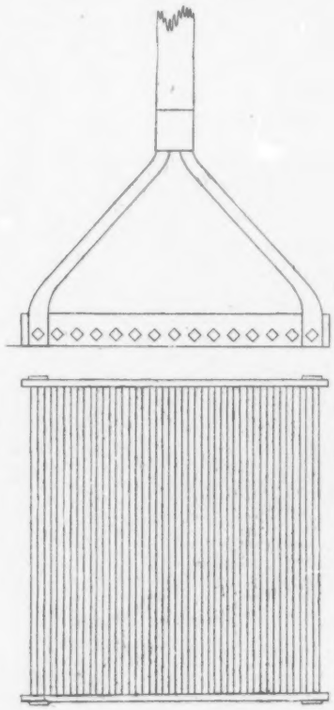
In the No. 1 pavement also there are ¾-inch transverse expansion joints every 40 feet, and if the pavement is more than 28 feet wide a longitudinal expansion joint runs continuously through the center of the roadway. Expansion joints are also placed along each curb, around manholes, etc., as in the case of No. 2 pavement, and all joints are filled in the same way. The transverse joints and the central longitudinal one have their edges protected with 2½ x 2½-inch steel angles, which are rolled with a corrugated or diamond surface to prevent their being slippery, and which are anchored in the concrete with anchor bolts. These angles are also used in the transverse expansion joints in No. 2 pavement. These the writer believes to be a very good thing, protecting the concrete pavements where they are most liable to fail.

CONCRETE PAVEMENTS IN GREENVILLE.

By H. N. Baumberger, City Engineer.

Greenville, Ill., is located in the center of one of the largest dairy districts of the United States, and the highways leading to and through the city are subjected to a daily traffic of narrow-tired wagons, which badly cut up the dirt roads. A few years ago the State Highway Commission built a mile of water-bound macadam in the city, which produced such a favorable impression that the city voted a special tax levy for five years to build several more miles of macadam.

In the summer of 1910 several wealthy farmers living along a narrow road raised $4,500 to construct an experimental concrete pavement along about 3,900 feet of this, the roadway being made 16 feet wide. The total thickness of the concrete was made 6½ inches, 5 inches of this being a 1:6 base and a finishing coat of 1:2 mortar 1½ inches thick being added. Fine sand was used for the finishing coat, such as is ordinarily used for cement sidewalks. Expansion joints were placed across the



pavement every 25 feet, these being filled with three layers of tar paper at first, and later with builders' felt. The materials used, with the exception of the cement, were of poor quality; dirty pond water was used, and the mixing was done with a hand mixer rigged up to run with a gasoline engine. Moreover no gravel sub-base was specified, although the subsoil was clay and the season an unusually wet one. After fifteen months' use nearly three-fourths of the blocks were cracked across the entire width parallel with and midway between the transverse expansion joints, and there is also a crack extending down the center of the pavement for almost its entire length. The surface coat has spalled off in several places, and holes worn rapidly into the base. In spite of these mistakes in construction, and defects in the pavement, the latter have been repaired at small expense and the pavement now shows few signs of wear. The contract price for this pavement was 65 cents per square yard, exclusive of the excavating and preparation of the roadbed.

Concluding that this pavement was a move in the right direction, although being a long way from perfection, the highway commissioners decided to substitute concrete in place of macadam, which it had been voted to use on a road across a creek bottom. A new right of way was bought, and no attempt was made to elevate the roadway above high water mark and provide culverts, as had been intended if macadam were used. This saved the cost of 3,000 feet of fill and three cement culverts. The pavement was made 16 feet wide, and consisted of 8 inches of Portland cement concrete, mixed one part cement, 2½ clean, sharp sand, and 5 of broken limestone. Three-fourth inch expansion joints filled with paving pitch were placed across the pavement at 25 feet intervals. A machine mixer was used, and the concrete made of such consistency that when well tamped a sufficient amount of cement and sand mortar would flush to the top to give a smooth finish. Eight-inch stringers were used for forms, one being placed one inch lower than the other. The only finish given to the top surface was that resulting from the use of a hand tamper by an experienced man. Great care was taken to insure that both sides of each expansion joint be at exactly the same elevation, so that the jar to and by the traffic on the edge of the joint would be minimized. No cracks have appeared in this pavement, nor any signs of wear developed. The contract prices were 20 cents for excavating, 92 cents per square yard for finished pavement, and 2½ cents for expansion joints. The broken stone was furnished free to the contractor at the railroad yard, but cost him 50 cents on the job. Sand cost 80 cents per yard, cement $1.22 per barrel and labor $1.75 for a nine-hour day.

Last year the city built 3,500 square yards of concrete pavement, with combined curb and gutter of the same material and mixture. This pavement was constructed as follows: On the prepared subgrade concrete mixed one part cement to four parts of sand and gravel was laid to a depth of 6 inches. This was deposited in strips extending across the full width between curbs as soon as possible after mixing, and was tamped to a uniform surface with hand tampers, the concrete being mixed of such consistency that the cement would flush to the top when tamped. The surface was then given a smooth finish, and before it had set was given a brush finish and corrugated with a roller made for that purpose. These corrugations show quite plainly in the accompanying photograph. Expansion joints were made between the pavement and the curb, across street intersections on a line with the edge of the gutter, and across the pavement every 25 feet. These extended entirely through the pavement, and were a half inch wide, filled with paving pitch. As in the case of the road described above, great care was taken to see that the edges of the pavement on the two sides of each cross expansion joint were at exactly the same elevation.

Before deciding on the 1:4 mixture a number of tests were made of the "run of bank" gravel, and we found that this proportion gave an excess of cement of about 7 per cent. This contract was performed by G. L. Loggins, using a 40-yard "Systematic" mixer, who laid and finished an average of 350 square yards per day. The contract prices were: Excavating, 24 cents; curb and gutter, 26 cents; expansion joint, 2½ cents; finished pavement, 75 cents per square yard. The cement cost $1 per barrel; sand and gravel, 80 cents per cu. yd.; labor, $1.75 per day.

This pavement cost 45 per cent less than brick, is practically noiseless in comparison, affords a good foothold for horses, and is easily cleaned. We are so sure that this street is a success that we are preparing to let a contract for 8,000 square yards more to be laid in the same way.

My experience has been that it is very important to have a clean, even mix of uniform consistency. Clean water, sand and gravel, free from clay, loam and other foreign matter, must be used to get the best results. I believe it is a mistake to attempt two-coat work on pavements, not only from an economical standpoint, but also from the fact that the thin upper coat jars loose from the lower and easily spalls off.

NORTHWESTERN WILL MAKE CONCRETE BLOCKS.

Clinton (Ia.) Herald: The Chicago & North-Western Railroad is making preparations for the manufacture of cement slabs, to be used in bridge construction on its system in Clinton.

A series of large platforms is being built between Second street and the bridge, about 450 feet long, and on these platforms the slabs will be manufactured. A pipe line will be run from the pump house to furnish water, and the location is an advantageous one for loading and unloading cars.

The slabs to be manufactured will be of great size. They are to be placed in the bottom of girders in the bridges, several ballast to be placed on top of them, filling the girders up even with the roadbed.

An immense quantity of these big cement slabs will be manufactured the coming summer. The work probably will be in progress during the entire summer. It is in charge of Stephen Butt. The cement used in the manufacture of the slabs will be stored in cars and the finished product will be shipped out of Clinton as fast as it is turned out and taken to various places on the system where new bridges are being constructed.

Concrete

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Meets Annually.

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Logan Waller Page, Washington D. C.—Education.

LOUISVILLE CONCRETE NEWS.

Louisville, Ky., June 18.—When the month just passed has been productive of more building than any corresponding period in the history of the Louisville Building Inspection Bureau, the concrete interests of the Gateway City are nothing if not prosperous. For with an influx of general structural work in a city of the size and progressiveness of the Bluegrass metropolis, that concreting should assume a leading position is a matter of course.

The weather is as favorable as it possibly could be for every man who works in cement and sand. The most vexatious natural conditions under which a concrete worker could operate have become a memory. They existed in March and April and have disappeared. Consequently most of the foundation work, the paving and the miscellaneous calls, numbering legion for the concrete worker, have been pushed well along to the stage of completion, and new jobs are developing daily, almost hourly.

The Central Concrete Construction Company is about to write "finis" at the foot of one of the notable contracts of its history. The company is now finishing off, as its chief work, the Arcade, which it commenced last fall and which has advanced through various stages of construction under the most favorable weather conditions that the past winter could produce. It will not be long before the Arcade is ready for its occupants. The structure is one of the most unique in Louisville, standing, in fact, as the only one of its kind in the Falls City. The oriental type of business house, the bazaar, has been modified to meet Bluegrass conditions and has been set up in concrete, with brick curtain walls and an all-glass exterior. The structure contains fifteen small stores, ten upstairs and five on the ground floor. It is now being tastefully decorated in mosaic, and the glass exterior is being supplied.

While the National Concrete Construction Company reported no work of especial moment on hand at present, the Board of Trade engineers, who have handled some of the biggest jobs in this section, are busy with a vast number of small contracts which have been brought out by the fine weather. The National company is also figuring upon a big reinforced concrete hotel which will be erected in the near future by the Vendome Hotel Company, of Evansville, Ind., supplying a $250,000 addition for that hostelry.

The Tycrete Concrete Products Company has suspended business, preparatory to dissolution, and President G. E. Moody has requested all creditors of the concern to present their claims at his office in the Paul Jones Building prior to settlement. The Tycrete concrete company, although launched into the field only a year or so ago, with every prospect of success, has failed to do business successfully, for some unknown reasons, and Mr. Moody and his associates have voted to withdraw their holdings from the plant, which was equipped to manufacture all sorts of blocks, fence posts and monuments.

Russell L. Telford, a concrete contractor, with offices in the Board of Trade Building, has filed a voluntary petition in bankruptcy with the Federal Court in Louisville. The schedule filed with the petition fixes his liabilities at $6,846, with assets aggregating $1,255.

One of the educational features of the Kentucky State Fair for the farming fraternity—one which, incidentally, will arouse interest in a certain branch of concreting and which will probably result in increased consumption of cement—is to be a concrete silo of the most approved type. J. W. Newman, Commissioner of Agriculture, has completed arrangements for the erection of this silo, and Secretary H. L. Dent is now in charge of the work. The Board of Agriculture is extremely interested in the modern silo as a means of effecting a saving in the cost of doing business for the farmer. It has secured the support of the Federal Department of Agriculture in sending an expert in concrete silo construction through the state in the near future, and the recent move to institute a silo at the 1912 exposition, to be held in Louisville during the second week in September, indicates the spirit of the campaign to help out the tiller of the soil.

Phillips Brothers, well-known concrete workers, of Stanford, Ky., have contracted with the municipality to lay a considerable mileage of concrete sidewalks in Stanford during the summer. The council is determined to replace every brick walk in the city with concrete as soon as possible, more especially in those sections where repairs are badly needed.

Benton, Ky., has climbed into the band wagon for better streets and highways, and George Katterjohn, a well-known concrete contractor of Paducah, is in possession of an award which will require him to lay two miles of concrete sidewalks in Benton during the next month or so. The work is to commence at once.

The enterprise of George Katterjohn, a prominent concrete worker of Paducah, Ky., coupled with the philanthropic tendencies of several of Paducah's best known business men, has resulted in a concrete walk being set surrounding the Home of the Friendless in that city. The institution stood badly in need of modern paving, as Mr. Katterjohn pointed out, and he combined capital effectively with several public-spirited citizens to supply the improvement.

The Memphis Mosaic Tile Works has been incorporated with $125,000 capital stock in Memphis, Tenn. The new company in the Bluff City will manufacture and market a peculiar type of concrete tile which will be especially suitable for a number of structural purposes. The concern is stated to be a branch of the National Mosaic Flooring Company, of Mobile, Ala., and possesses the following incorporators: James Alexander, O. K. Houck, Charles R. Miller, James Omberg, Jr., all of Memphis, and William F. Tebbetts, of Mobile.

CONCRETE IN ILLINOIS.

Springfield, Ill., June 21.—Construction of concrete sidewalks in Illinois has been noteworthy. In Venice eight miles were laid, the improvement costing $31,000. One Bloomington contractor had five gangs at work and, getting the walk laid at the rate of two blocks a day, had nearly two months' work ahead. Even Golden Gate, a village, voted $1,600 for concrete walks. A new ordinance has been passed in Bloomington requiring all concrete sidewalk contractors to give a bond of $1,000 to leave streets in a satisfactory condition.

Among the novelties in concrete construction in the state are at Deland, where bids were asked for the construction of concrete hitchracks, and at Harris Station, near Farmer City, where the Farmers' Grain Company is erecting an all-concrete coal shed 80x13 and 12 feet deep. The roof of the latter will be reinforced and steel will be used for door and window frames.

Albert Johnson, 143 Woodlawn avenue, Aurora, has taken over the sidewalk contracting business of the late R. F. Safford.

Marion Kelso, of Congersville, has embarked in the concrete contracting business.

J. S. Dowdy & Son, of Atlanta, have purchased a site in that city for the erection of a concrete building to be used as a factory for concrete posts, blocks, brick and other cement products.

W. M. McFarlane has built quarters at Waterman for the manufacture of cement burial vaults.

The Pogue Brothers Lumber Company, of Hinckley, has built new sheds for its concrete block industry and also for a cement, lime and plaster storage house.

The Wheeler Construction Company has built a new office and warehouse at Geneva, Ill., for housing its machinery. Since the sale of the retail building material business to W. C. Cannon it has been without adequate quarters. The machinery has been returned from Des Moines, Iowa, the big concrete bridge project there having been finished. The new Iowa structure will be advertised by the Wheeler company by the blotter medium.

E. F. Wilson, of Bloomington, has purchased the interest of Earl D. Arnett in the Arnett-Wilson Contracting Company, which made a specialty of concrete contracting. Mr. Arnett has gone to Jackson, Mich., where he has purchased an interest in the Morells Manufacturing Company, makers of concrete mixers. He will be office and factory manager.

Daniel B. Luten, of Indianapolis, Ind., asked the federal court at Danville, Ill., to issue an injunction against the Newton Engineering & Construction Company, of Newton, Ill., restraining them from using his invention—a special type of concrete arch construction—in their bridge work. Luten alleged that R. H. Barnett and S. A. Connor, representing the Newton firm, have been using his patent on their bridge work for several years, although they had been warned of the infringement.

George H. Hailey, chief engineer with the Cleary-White Construction Company, has moved with his family to Southbridge, Mass., to superintend a big concrete job, but will return the last week in each month to Illinois, where he is superintending the concrete work on the North-Western railroad's new line between Peoria, Greenridge and Carlinville. At Bartonville, where the new line crosses three other roads, 60-foot concrete piers are being used for the viaduct.

James Gott, of Washington, is in charge of the building of the 70-foot concrete viaduct in Washington which will carry the Toledo, Peoria & Western Railway's tracks over a city street. It will cost about $10,000.

Considerable concrete work will be done at Rossville, Ill., by the Elgin, Joliet & Eastern Railway. W. C. Thurber, trainmaster, is quoted as saying that improvements will be made, including a ten-stall roundhouse of concrete and some concrete block office buildings. The appropriation made by the road for the work is $105,727.

W. H. Shons, of Freeport, was awarded the contract to build the Old Texas bridge near Watseka for $6,464. There will be three 55-foot spans. In twelve days this summer Mr. Shons secured sixty-three bridge contracts, sustaining his reputation for being the most aggressive concrete bridge builder in the state.

Perry Duckles, of Carlinville, used a half car of cement in a 45-foot 150-ton silo near Chesterfield.

NEW YORK CONCRETE NEWS.

New York, N. Y., June 13.—Bids were received by Oscar Lewisohn, 5 West Thirty-first Street, New York City, for the 3-story reinforced concrete factory, 200x142 feet, to be erected in Jackson Avenue, Long Island City, N. Y.

A reinforced concrete 5-story storehouse, 100x100 feet, at 206 Erie Street, Jersey City, N. J., is being erected for the Safety Car Heating & Lighting Company, 2 Rector Street, New York City. The Turner Construction Company, 11 Broadway, New York City, are general contractors, and Charles H. Caldwell, 160 Fifth Avenue, New York City, is the architect.

The Barrows-Stewart Company, 1123 Broadway, New York City, has received the contract to erect the following concrete structures for the West Virginia Pulp & Paper Company, of Mechanicsville, N. Y. The buildings are as follows: Sedimentation basin, 325x110 feet; clear water reservoir, 325x85 feet; storage and mixing house, 54x28 feet. F. G. Broeck, 200 Fifth Avenue, New York City, architect.

The Turner Construction Company, of 11 Broadway, New York City, have received the following contracts: A concrete factory for James C. Doran & Co., Providence, R. I., building L shape, having 13,000 square feet per floor and nine stories in height (Monks & Johnson are the archiects); a reinforced concrete oil building for Valentine & Co., 364 Manhattan Avenue, Brooklyn, N. Y. (this structure is two stories high and 64x33 feet); a reinforced concrete building for the Hartford Suspension Company, Morgan Street, Jersey City, N. J., six stories high, 75x127 feet (Howard Chapman, architect).

MEMPHIS CONCRETE NEWS.

Memphis, Tenn., June 15.—The cement market and building materials in general are right much cut up here, and, while the activity is considerable, in many instances the profit is nil. Some of the dealers have mentioned this to your correspondent and say that it has gone on for many months.

Work on Main Street, in the factory and residence district, is taking up considerable cement. Municipal paving has been on a good scale this year. Then, too, realty companies have been liberal buyers for subdivision work.

Work will commence between now and fall on a large addition to the Bank of Commerce & Trust Company skyscraper that will stand where the Luehremann Hotel now stands. The structure will be fifteen stories high.

Brinkley Snowden has under erection a theatre opposite Hotel Gayosa and is having the site of the Bijou Theatre cleared for a large hotel that will go up on the corner of Linden and Main Streets.

The Chickasaw Candy Company is to have a reinforced concrete factory building erected right away in Memphis.

W. W. Fischer, of the Fischer Lime & Cement Company, was on the ticket of the new directorate of the Business Men's Club.

The board of city commissioners has let the contract to W. H. McGuire, of Hobart, Okla., for a crematory. The contract price is $19,200.

Steve Wright, of the Wright Lime & Cement Company, says that trade is active enough but that prices are very indifferent. He looks to see the summer record well maintained on Memphis building.

S. D. Harvey has the contract for the foundation work of the R. Brinkley Snowden hotel, at Main and Linden Streets. Hanker & Cairns drew the plans.

Isele Bros. still have under contemplation a hotel at Main and Adams Streets, where the Arlington now stands. If the North Main Street business men will take stock to a reasonable extent it looks like this hotel will be built.

Architects Jones & Furbringer are taking bids for the erection of a school building at Seventh Street and Auction Avenue.

A reinforced concrete warehouse, of three stories, costing $50,000, will be erected shortly by the James Alexander Construction Company, at the northeast corner of Auction and Front Streets.

W. H. Reid has let the contract for the construction of a culvert over Bayou Gayosa, on Monroe Avenue, to cost about $10,000. A two-story building for him will be erected near by, after plans by Architect G. M. Shaw.

Ed Manigan, a well-known paving contractor of Memphis, member of the firm of Roach & Manigan, died at New Orleans a few days ago. Mr. Manigan was a native of Memphis and was 40 years old.

F. D. Harvey & Co., of Memphis, have been awarded a large road building contract at Aberdeen, Miss., to build the roads for Monroe county.

Memphis Road Contracts.

J. H. Weatherford, city engineer, and George C. Love, commissioner of streets, have received bids and awarded street contracts here as follows: Nelson Avenue, E. J. Wetterstrom, concrete paving, $11,800.75; Willett Street between Poplar and Peach, McTighe & Hanson, dolarway pavement, $8,960; Oakview Street between Lamar and the Southern Railroad, M. E. Larkin, tar macadam, $8,724; Richmond Avenue between Orleans and Mississippi Boulevards, Memphis Asphalt & Paving Company, asphaltic concrete, $10,684; Mississippi Boulevard between Lauderdale Street and Iowa Avenue, Pouncey Paving & Construction Company, brick, $6,705; Woodlawn between Chelsea and City Limits, F. D. Harvey & Co., $6,967.79.

Oliver C. Sloan has been awarded the contract at Trezevant, Tenn., for about 6,800 feet of concrete paving for the municipality and citizens.

C. E. Larde, paving contractor, is laying an extensive run of concrete sidewalk at McKenzie, Tenn.

The Mullarky Construction Company has the contract for a lot of street paving at Cullman, Ala.

M. L. Bazzell, of Paris, Tenn., has several concrete paving jobs on hand at Paris, McKenzie and neighboring towns.

PITTRBURG CONCRETE NEWS.

Three weeks ago every firm in the city was busy on this kind of business. Just at present there is apparently little big work on the boards. Several firms are interested in out-of-town jobs which are to be let shortly. Among these is a large amount of railroad work to be done in Cleveland, including machine shops, etc., for the Pennsylvania, and also a big freight station at the terminal at Youngstown, Ohio, for the Baltimore & Ohio. A good number of concrete bridges will be up also for early letting. In the city the work is still advancing on the reinforced concrete warehouses that were started early in the spring. There is no doubt that as soon as the cutting of the hump has progressed a little farther an enormous amount of concrete work will be done in the way of retaining walls, sidewalks and reinforced concrete buildings. To this engineers and architects are looking for a busy fall.

Irvin & Witherow have work nicely started on the George A. Kelly Company warehouse on Duquesne way, to cost $100,000. This will be one of the most notable reinforced concrete structures in the city. On the opposite side of the river the Alling & Corry Paper Company warehouse is going up rapidly. This is also a reinforced concrete job. Irvin & Witherow recently let the contract to the William Miller & Sons Company for a reinforced concrete addition and alteration job for the Allegheny Plate Glass Company at its plant at Glassmere, Pa.

The western Pennsylvania Paper Company has taken bids through Architects Rutan & Russell for an 8-story reinforced concrete warehouse 60x74 feet at the southeast corner of Penn Avenue and Third Street.

SAN FRANCISCO CONCRETE NEW.

The leading items of interest are two large dams under construction for the Great Western Power Company and the Pacific Gas & Electric Company. The former concern is now working on a concrete structure at Nevis, Cal., on the Feather river, and has already completed the cofferdam and flume.

For the Pacific Gas & Electric work the Southern Pacific Railroad has opened a station for handling materials two miles east of Emigrant Gap, near where the dam is being started on Bear river. It is reported that over 1,000 men will be employed there this summer, and the company has placed orders for a lot of Smith concrete mixers, two No. 6 McCully crushers, three locomotives, and a lot of elevating and conveying machinery.

A notable concrete residence is soon to be built in Hillsborough, a fashionable suburb of San Francisco, for Joseph D. Grant. It will be in a classic style, two stories, with attic and basement, of reinforced concrete throughout, and when completed will cost about $300,000. The plans are being drawn by Architect Lewis P. Hobart, this city.

From borings recently made it has been decided that a complete concrete lining will be necessary for the projected tunnel under the Fillmore street hill in this city.

The American Centrifugal Concrete Company, capitalized at $1,000,000, has arranged to take over the plant of the Centrifugal Concrete Company at Long Beach, Cal. The plant will be enlarged and ornamental concrete poles will be manufactured by a German process.

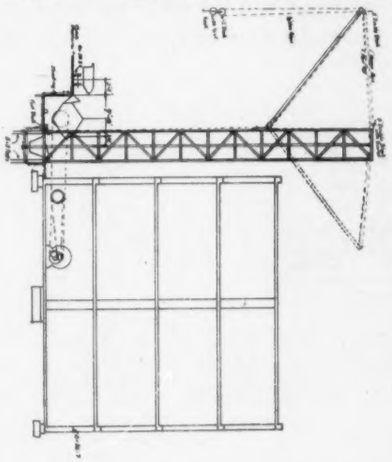
Oscar Parlier, of Tulare, Cal., has taken a contract for concrete sidewalks around the Southern Pacific Railroad property at that place. The job amounts to 10,000 square feet and is the largest single sidewalk contract ever let at Tulare.

THE CONCRETE PLANT ON A FOUR-STORY MACHINE SHOP JOB.

During the course of last winter the Aberthaw Construction Company of Boston erected a 4-story reinforced concrete machine shop at Lowell, Mass., for the Lamson Consolidated Store Service Company. This reinforced concrete building is 150 by 50 feet in plan and has brick curtain walls. The general policy of the contractors is to heat both the sand and the stone in freezing weather. However, on this only the sand was heated, as the owners, who provided the heat, had not sufficient steam capacity to heat the stone also. The stone was received in cars and while the car was on the siding precautions were taken to keep snow out of it by canvas covering. The sand was delivered in wagons and dumped directly onto steam pipes laid on the ground and furnished with a continuous supply of steam during the day time only at about 12 pounds pressure. To supplement this the contractors used flexible rubber steam hose and iron pipes which were thrust into the sand heaps in specific places where there was reason to doubt the temperature of the sand. The water was heated by having a steam pipe reaching to the bottom of the water barrel, and salt was added generally in the proportion of about 2 per cent of weight to the amount of the cement used, the percentage being varied slightly as the temperature changed.

After examining the ground it was decided to place the mixer and hoisting tower at the north side of the building and to omit the building of one bay at the west end of the ground floor, so as to allow industrial cars with the coarse aggregate to be pushed through at the proper grade. Quick unloading chute, extending from the side of the standard gauge cars, were used, the material being dumped into a square bodied dump car.

After being mixed the concrete was dumped into the Aberthaw hoisting bucket which is standard with this concern in all their construction work. The Aberthaw iron hoisting tower was used with the boom, moving the steel and centering to the upper floors. The distributing of the concrete was done with V-shaped Koppell cars, the length of carriage from the mixer to the point where it was placed on the job in question averaging less than 100 feet. The method of distribution with cars, which take an entire four-bag batch at one time, is very much more conservative in retaining the heat in the mass than when concrete is distributed in barrows. It should be added that salamanders



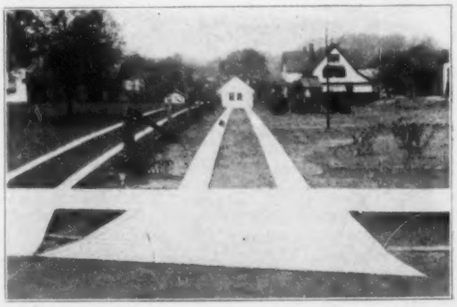
were used after placing the concrete in each floor and the building enclosed in canvas, floor by floor. The building was designed by Lockwood, Greene & Co., Boston.

CONCRETE ROADS IN KENTUCKY.

Louisville, Ky., June 18.—That the introduction of the concrete roadway to Kentucky may be expected within the next few months is a fact vouched for by one of the best known cement manufacturers of the Bluegrass commonwealth, who has requested that his name be withheld from publication. It is likewise a fact universally given credence in the trade that the concrete highway is just what Kentucky has been waiting for these many moons.

"In Wayne county, Michigan," said the cement manufacturer referred to, "the concrete road made its first appearance for the first time in America. There are about twenty-five miles of the approved type of highway in this section, and by this time next year I hope to see an equal mileage in this state. Whether for urban or suburban use, the hard-packed surface is both practicable and desirable. The first steps toward its adoption in this section, I understand, are to arise out in the state, where favorable feeling among community and cooperative road builders is strong in these days of campaigning for better turnpikes.

"Only concerted effort on the part of cement producers hereabouts is necessary to commend the concrete street to municipal authorities, for this type of construction speaks for itself. It is practically indestructible, requiring absolutely no repairs, and, so far as we can see, the next cheapest class of surfacing would be cobblestones, at $1.00 per square yard—a street which is infinitely inferior. Here in Kentucky any city could lay concrete streets at a cost not to exceed $1.05 per square yard. Last but not least, concrete streets which have not been troweled to an excessive degree of smoothness are best by test for both motor-driven and horse-drawn traffic. They wouldn't do for a Kentucky thoroughbred to work a mile in 2:00 flat, of course, but that won't keep them out of the state."



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TO SELL SEABOARD.

New York, N. Y., June 12.—On June 28, at the court house in the village of Catskill, Special Master Bradford Butler, of New York City, will sell all of the property, real and personal, of the company to the highest bidder. That there will be a bidder—possibly several of them—there is little doubt. And, while the history of the Seaboard Portland Cement plant at Alsen has been one of prolonged trouble, with lawsuits, cross suits, counter suits, receiverships, and finally bankruptcy proceedings, the best advices are to the effect that this last proceeding has been to enable somebody to obtain a clear title to the property, that it may be placed in operation and made to do the work for which it was intended. The entire property will be bid off in one parcel, which favors the idea that somebody is going to bid who has an idea of continuing—or rather commencing the manufacture of cement.

CHICAGO CEMENT NEWS.

Chicago, Ill., June 21.—For the past two months conditions in the cement trade have been good. Shipments have been heavier than usual and big contracts are coming in daily. New business, it is said, has not been as large in volume as last year, probably owing to the fact that railroads have not been buying but are now commencing to place orders. On the whole, consumption of cement promises to be larger than last year. The action of the Canadian Government in reducing the duty on cement one-half will have the effect of greatly stimulating shipments into that territory and increasing the output of mills in this country. Prices have been low this year, are steady, and show a tendency toward a higher level.

J. U. C. McDaniel, traffic manager of the Chicago Portland Cement Company, said: "The demand for cement is good and big contracts are coming out every day. Our shipments in May were heavier than for the same period in past years and the same holds good this month. Since the duty on cement was reduced fifty per cent by the Canadian government a great deal of cement will be shipped into that territory, which will naturally have a tendency of steadying prices and be beneficial to the cement manufacturers in this country. The outlook in general in the cement industry this season is fair and satisfactory."

Gold Williams, sales agent of the Marquette Cement Manufacturing Company, reported that the new business this year was not as large in volume as last year and that the season was too far advanced to make it probable to catch up during the latter part of the year. The Canadian government reducing the duty on cement fifty per cent will stimulate shipments into that territory producing a healthy influence on production and prices in the cement trade of this country.

Frederick E. Paulson, general manager traffic and sales of the Lehigh Portland Cement Company, said that for some time they had shipped large quantities of cement into Canada and now that the duty in Canada had been reduced one half would increase their shipments into that territory rapidly. The demand for cement is good this year and the season's business so far has been satisfactory.

Edward L. Cox, of the German-American Portland Cement Works, said that the consumption of cement is not as great so far as last year. This has been due to the fact that railroads this spring have not been buying, but now are commencing to dip in. Prices are stiffening some, while demand and shipments are good.

B. F. Affleck, sales manager of the Universal Portland Cement Company, stated that he found the consumption of cement greater than last year. Shipments during the last two months were heavy and satisfactory and the demand good. The reduction of the duty on cement fifty per cent in Canada will greatly increase shipments of cement into that territory, especially from mills near the border. All manufacturers of cement in this country will indirectly feel beneficial results. On the whole, he considers conditions good in the trade and that the fall season will show great activity.

George W. DeSmet, distributor of Portland cement, waterproofing compounds and DeSmet compressed cement tile, has moved his office from the fourth to the sixth floor of the Chamber of Commerce, where he has much more commodious quarters. He has just issued a neat catalogue which contains full information of the DeSmet compressed cement tile for floors and walls in any color. It also contains facsimile letters of leading architects who have used this product and commend it highly. He will be pleased to send it to any address on application.

LOUISVILLE CEMENT NEWS.

Louisville, Ky., June 18.—The situation of the Southern cement trade, as opposed to its companion branches in the West and East, is pronounced to be a trifle weak. This condition arises solely from the lack of backbone in prices, it is asserted, for demand is good and the land of cotton is in the midst of one of the most notable building booms in its history. That improvement is due shortly after the effects of the late crops and the coming presidential election have passed away is a matter of fact.

The reason that prices are not stronger than they are at present is that they are forced into a position of lassitude. The building field simply will not stand the payment of a greater margin of profit upon any line of material, for, although there is a boom afloat in the South, it is one of the slow-going sort which is steady and not liable to sudden puncture. A late spring season has thrown all agricultural and industrial activity behind and the financial backing of the many building enterprises is simply accruing bit by bit. Consequently, contractors as well as the men behind the work in hand are demanding hand-to-mouth prices in self-defense.

Kentucky cement manufacturers are not complaining unduly, however. All Bluegrass mills are running full time and their owners are taking the fact of a boom in building during a presidential year as assurance of continued prosperity. It is a safe assertion that conditions might be 100 per cent worse than they are now without awakening any noticeable unrest in the industry.

The position of J. B. Speed & Company is clearly defined. Business is good, for prices are fair and especially good demand is being produced from several jobs of the bumper type which the Speed interests are handling. The mills of the company at Speed's Station, Ind., a few miles north of Louisville, are running full time, and this year's production is not being diminished in the least because of the traditionally unfavorable outlook for fall, when a chief executive will be elected for the United States.

With the prospect of immediate sales, stretching out for several months into the future, for 200,000 barrels of cement, the Speed interests are satisfied. The job of prime importance in hand at present is that of furnishing Speed's Portland cement to the contractors in charge of road improvement for the Louisville & Nashville Railroad Company. The L. & N. is running substantial improvements in the way of viaducts and bridges for miles along its Nashville, Tenn., and Birmingham, Ala., divisions and it is estimated that 150,000 barrels of cement will be required in the work.

Furthermore, the company is supplying 25,000 barrels of cement to the new $1,000,000 City Hospital which is now in course of construction. Several hundred barrels have been ordered by the Foster-Creighton-Gould Company for abutments and under-passes which constitute the finishing touches upon the new $2,000,000 bridge across the Ohio river at this point, and the Louisville Railway Company is concreting a road-bed for its cross-town line, seven miles in length, requiring about 20,000 barrels of Speed's cement.

The extensive interests of the Kosmos Portland Cement Company are flourishing to as great an extent as those of any cement-producing concern in the Bluegrass field. Although prices are a shade weaker than they should be, according to C. M. Timmons, the outlook is reasonably satisfactory and the company has all of the work it can handle, working its big plant at Kosmosdale, Ky., on a full schedule.

Charles Horner, of the Kosmos Portland Cement Company, who was stricken with a serious illness some time ago and who was removed to his home in Philadelphia, Pa., is reported to be improving in a most gratifying fashion. Mr. Horner has spent some time at Hot Springs, Va., recuperating from his sudden attack and is pronounced by his physicians to be upon the high road to recovery.

The junior and senior chemistry classes of the Louisville Male High School recently journeyed to Speed's Station, Ind., to inspect the process of making cement at the mills of J. B. Speed & Company. From the rock quarries of the extensive plant, the embryonic experts in chemistry toured on a special train along the narrow-gauge railway which encompasses the plant to the big ovens, where they gazed through smoked glasses into the fiery and revolving furnaces. Later the students inspected every inch of the testing laboratories and other buildings which compose the plant at large. As a finale for the occasion, the Speed company provided a delightful picnic lunch for a hundred or more husky lads and, before the party embarked on its special car for Louisville, everybody enjoyed a swim in the concrete reservoir.

The Kentucky Portland Cement & Coal Company, of Pine Hill, Rockcastle county, Ky., which was recently capitalized at $1,000,000 by eastern business men, is reported to have commenced the work of equipping its big new mills in Rockcastle county. R. B. Hutcheraft is chief engineer in charge of the work and has located at the Gilcher House in Danville while superintending the work in the field. The company plans to become a power in the Bluegrass cement trade, having vast natural and financial resources to back it.

SAN FRANCISCO CEMENT NEWS.

The past month has been marked not only by some improvement in the general demand for cement, but by a number of large contracts and inquiries. The Riverside Portland Cement Company is now delivering on a large contract for the San Diego Exposition, and the initial shipment on May 21, sent by sea from San Pedro, was 8,000 sacks.

The Government engineer at Seattle, Wash., will receive bids July 1 on 200,000 barrels of cement.

The Western Pacific Railroad recently purchased 9,000 barrels of cement for tunnel work. A grand jury at San Bernardino, Cal., has been investigating an alleged cement trust in that district, and has been questioning all dealers and contractors, as well as manufacturers within its jurisdiction. It is complained that cement made at San Bernardino is retailed there at a higher price than at Los Angeles.

The Olympic Portland Cement Company, which is putting up a plant at Bellingham, Wash., has let the steel contract for its building to the Riter-Conley Construction Company, of Pittsburgh, Pa.

P. W. Rochester, manager of the Association of Western Portland Cement Manufacturers, returned last week from an eastern trip and has just opened offices in San Francisco at 320-322 Rialto building.

CONCRETE GARAGE.

NEW WESTERN ASSOCIATION IS ACTIVE

The Association of Western Portland Cement Manufacturers is doing good work for the industry in that territory. The Seattle Post Intelligencer in a recent issue says:

"To inaugurate a coastwise movement for the creation of a vastly greater demand for concrete than now exists, and to promote in every possible manner the cause of good roads, Percy W. Rochester, secretary of the newly-formed Association of Western Portland Cement Manufacturers, left for San Francisco. According to Mr. Rochester, who resigned his position as sales manager for the Washington Portland Cement Company to undertake his new work, the beneficial results of the proconcrete campaign to cover the Coast from Mexico to British Columbia, and the West from the Rockies to the Pacific will be of direct and vital importance to Washington and to Seattle.

"This is an age of concrete," Mr. Rochester said. "It is also an age of good roads. The two go hand in hand. California has voted $18,000,000 bonds for good roads, all predicated on the theory that the new roads will be built with a permanent, or concrete, base. In Washington the leading and most public-spirited men are advocating a bond issue of $15,000,000 for the same purpose.

"Oregon is in line with a similar campaign. What we propose to do is to greatly increase the use of cement and thereby to reduce its cost, as has been accomplished by association of cement manufacturers in the East and Central West.

Important in Seattle.

"The work of the Association of Western Portland Cement Manufacturers is of direct and vital benefit to Seattle and Washington because of the investment in this state close to $5,000,000 in local cement plants. These works employ large numbers of men and their pay rolls amount to hundreds of thousands of dollars annually. Near Seattle and tributary to this city are two long established cement works, at Concrete, Wash., in which close to $3,000,000 of local capital is invested. Another cement plant is under construction at Bellingham, which will add more than $1,000,000 to the sum total of invested capital in western Washington cement industries.

"These plans bring forth from the ground a raw and undeveloped product in the form of lime rock and cement clay, which, when manufactured into Portland cement, is a market staple. To further the use of cement and concrete for all private as well as public purposes, the western cement manufacturers have formed the present non-profit sharing corporation.

"Instead of increasing the retail price of cement the object of the new organization will be strictly to enlarge the use of cement, increase production and lower the cost of production as well as the cost of the product to public as well as private consumers.

Permanent Base Essential.

"Experience of state road organizations and public boards in the East and Middle West in public roads construction has proved that a permanent base is the desideratum first to be considered. Temporary paving materials have been tried out and all authorities now unite in the conviction that, no matter what the surface material may be, permanency and cheapness of cost in the long run depend absolutely on a permanent base or foundation.

"Concrete is the material which has been determined to be best suited for this purpose and in the judgment of the best advised good roads authorities here, from Judge J. T. Ronald down, a concrete base or foundation must be provided in all cases where trunk roads or even arteries of country traffic are built at the expense of the public.

"I have been informed by the most prominent and best posted good roads leaders throughout the West that the present vigorous public movement in behalf of good roads will be carried on for several years and that the agitation will not cease until permanent good roads are established in all the Coast states as well as the intermountain states.

Good Roads Coming.

"In a few years it ought to be reasonably possible to drive in an automobile from Seattle to Denver and from Seattle to San Francisco in comfort and safety and in a fraction of the time now consumed. All the intermountain states and cities will be linked to those of the Pacific Coast within a few years by trunk lines having concrete as their base and equal in durability and lasting efficiency to the roads in England and on the Continent built by the Romans.

"The benefits of good roads construction, contrary to the belief entertained by some people, will not be restricted to owners of automobiling touring cars in the cities. Farmers and grain growers from Kansas west are rapidly getting into the motor habit, not only for pleasure purposes, but, more vitally speaking, for the transportation of the products of their farms, orchards and gardens. Herein lies an element of importance relating to the cost of living, for the lower the cost of transporting food products from the farm, orchard or garden to the city the less the cost to the ultimate consumer and the greater the profit to the producer.

"For these reasons it is clear that Washington is not to be found lagging in the campaign for good roads, relating as well to arteries of local traffic as to trunk lines. The Association of Western Portland Cement Manufacturers intends to take a hand in this movement, which is not restricted to class or locality, and to bear its part of the burden of labor and expense."

Office in this City.

Mr. Rochester said that general offices of the new association will be maintained in the principal cities of the Coast, including Seattle. Fifteen cement manufacturing companies, with an aggregate investment upwards of $25,000,000 are now in the association, covering every state between the Rocky Mountains and the Pacific Ocean.

Three Washington manufacturers figure in the list of members of the association, namely, the Washington Portland Cement Company and the Superior Portland Cement Company, both Seattle corporations, and the Inland Portland Cement Company, of Spokane.

REMOVING THE PITTSBURGH HUMP

Pittsburgh, June 13.—For forty years Pittsburgh has been dallying with the problem of how to get rid of the hump. Political issues have been settled or side-tracked time and time again on this question. Municipal campaigns have been lost or won on hump removal promises. Until Mayor William A. Magee got control of the municipal machinery of Pittsburgh nothing but promises could be secured. One or two bond issues were voted down by the people. The agitation carried on during his administration finally resulted in the passage of a bond issue and Mayor Magee at once proceeded as fast as the law would let him to have plans prepared by expert engineers and to get the contract awarded. This was done a few months ago. Several bids were submitted and the contract finally went to Booth & Flinn, Ltd., of Pittsburgh, one of the biggest contracting firms in Pennsylvania, and which has in late years figured conspicuously in enormous New York City jobs.

The work was started some four or five weeks ago and a great transformation in the appearance of the down town section has already been made on Fifth avenue. The cut at Grant street will be more than 16 feet and this is directly in front of the Frick building. Steam drills, dynamite blast and a steam shovel have all been used in this busy square between Grant and Smithfield to hasten the work. A large part of the material removed is shale rock, but there is no little hard rock that requires big charges to dislodge.

The greatest difficulty the contractors have is in the removal and replacing of the telephone and telegraph conduits, electric light wires and water and sewer pipes. It is expected that Fifth avenue will be opened again for street car traffic by July 15 if the contractors can continue their present rate of progress.

This hump removal job is some job. It embraces leveling off to a depth of from 2 to 16 or 18 feet some six or eight squares of property in the heart of the business section. Three big churches and dozens of store buildings and houses are being raised now to keep pace with the improvement. Director of Public Works Joseph G. Armstrong has notified all property owners that they must proceed with their part of the work just as rapidly as the contractors make ready for them and as a result there is likely to be a building boom on the hump this fall. The Frick and Mellon holdings comprise nearly one-half of the property affected except what is owned by Allegheny county. The Mellons have already started to remove their banking house on Fifth avenue and are arranging to raze all their buildings on Grant street, preparatory it is believed, to erecting new structures this fall on the level, 16 feet lower than the present street.

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REMOVING THE HEART OF PITTSBURGH.

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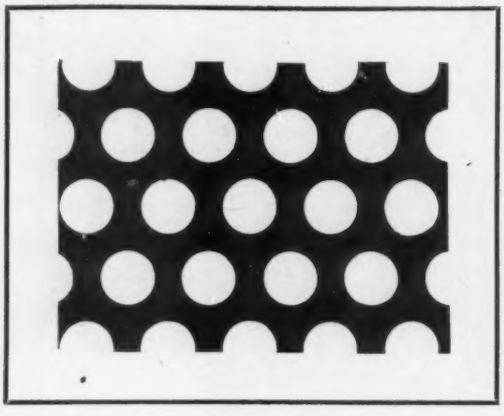

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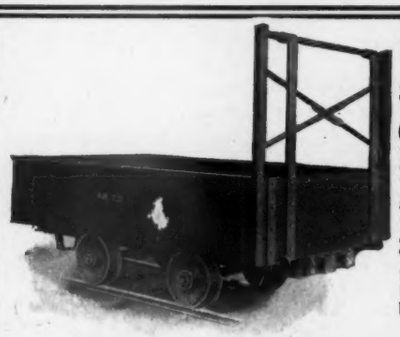

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TRADE MARK.

PRINCIPLES OF CEMENT GRINDING

Increased competition in the cement business is causing the manufacturer to use every endeavor to reduce the cost of manufacture. Naturally one of the first matters to receive his attention is the grinding machinery, as this forms such an important part of a cement plant; in fact, often determines a profit or a loss to the whole business, it deserves most intelligent investigation.

Five important elements enter into the cost of grinding cement materials:

1—Cost of grinding machinery.
2—Power to operate.
3—Wear and tear (up keep).
4—Production (output).
5—Continuous operation (absence of shut downs).

In other words, the cost of producing finished cement per barrel per hour in the grinding mills, covers all of these items and the cheapest method of procuring this result is the aim of every cement manufacturer.

Large units have come to stay, for the cement business is one of large proportions and the use of many small individual machines is becoming obsolete, and rightly so, for who will install ten small grinders when two large ones will do the work?

It is acknowledged by experienced cement engineers that with any of the small machines now in use it requires from 6 to 10 H. P. per hour per barrel to reduce Portland cement clinker to a finish; that the wear and tear is from $800 to $1,800 per year per grinding mill (tube mills excepted).

The above figures are only for clinker. The cost of grinding limestone, coal, shale and clay, while not so great for upkeep, yet the power is practically the same.

Now, if a large unit can produce the same results with one-half the power and at one-half the cost for upkeep, one can readily appreciate the reason for its adoption.

The Sturtevant Cement Unit does all this, and more, for it opens up new possibilities for the cement manufacturer. It not only lessens materially the cost of his finished product, thus making large savings in all of his grinding departments, but lessens labor, cheapens buildings, because of the small space occupied for large outputs, simplifies and unifies the entire plant. It ensures continuous operation, by practically eliminating breakdowns and by its few and accessible parts, the time required for replacements is only a small fraction of that necessary with even the smallest machine.

This unit consists of a Giant Duplex Ring Roll Mill, an elevator, two Newaygo Separators and one Tube Mill.

This is a simple, compact arrangement for clinker, limestone or coal and has enormous capacity.

The giant ring roll is used in combination with a tube mill for two reasons:

First: Because no single machine can do two kinds of work with equal efficiency; i. e., it is either better as a preliminary grinder than as a finisher, or vice versa.

No mill having internal screens can be as efficient as a mill that is free to grind and discharge its finished product the instant it is made.

It has proved a physical impossibility to make internal screens of sufficient size or give them proper vibration to handle the product of any good grinder. The result is that much of the sufficiently ground material cannot escape, which cushions and thus cripples the grinding action of the machine, lowering its efficiency and causing much useless wear and tear and bearing trouble due to excessive confined dust.

By removing the screens from ball and other mills tests have proved the mill efficiency was increased by as much as 33⅓ per cent.

Again, it is never economical to either screen or air separate a finished product as fine as cement. It is too delicate an operation, it takes too much space and power and it is complicated. Screening coarse material is easy, but with dust of cement fineness it is impractical on a large scale.

The ring roll can finish, and some manufacturers would sell it for such work, but we would rather use it in just the place for which it is best adapted, and if there ever was an ideal preliminary grinder the ring roll is the machine.

On 20 mesh grinding, taking clinker 1½ inch size, its output is from 80 to 130 barrels per hour. On 40 mesh work, 60 to 80 barrels. On 80 mesh grinding, 40 to 60 barrels per hour. All of this is accomplished with 80 H. P.

When a preliminary grinder will do such work as that, why try to make it finish or do something that no grinder of its class should be asked to do, and hamper it with internal screens that hold in material already reduced, and clog and render the grinding members ineffective?

Second: Why do we recommend a tube mill as a finisher when we do not build them and have no interest whatever in tube mills?

Because the tube mill properly used is just as ideal a finisher as the ring roll is as a preparatory grinder.

Properly used the tube mill is a big unit with no small parts to give trouble—and it is a continuous operator.

Even the power is in its favor instead of against it, as most people think. Grinding with a 20 mesh feed it does unquestionably take too much power for its output; i. e., 75 H. P. is needed to drive a 6x22 mill to get from it only 12 to 15 barrels per hour (H. P. per barrel per hour approximately 7 H. P.).

But take that same 75 H. P. and feed the tube with 40 mesh clinker and note the results: 30 barrels per hour instead of 12 to 15 barrels as before (H. P. per barrel per hour approximately 2½ H. P.).

Now, again, take the same mill, same power, and give it an 80 mesh feed. The results will be a revelation It now produces from 40 to 55 barrels per hour (H. P. per barrel per hour approximately 1½ H. P.).

Let us see next what can be expected from a unit, properly arranged, on a scientific basis, where screens are used, but in their proper place; and each machine operated in a highly specialized manner, never allowing either to do anything except just that work for which its proved adaptibility cannot be questioned.

Plant.

1—No. 2 duplex ring roll mill taking 1½-inch to 2-inch clinker and grinding to 80 mesh. Capacity, 40 to 60 barrels per hour; power, 80 to 90 H. P.

2—No. 3 Newaygo Screens. To take out the 80 mesh material from the ring roll product. Comparatively coarse screening and 100 sq. ft. of efficiently vibrated 40- mesh wire cloth to do the work. Power, 1 H. P. each.

1—6x18 tube mill. To take the screened 80 mesh ground clinker from the ring roll and Newaygo screens and reducing it to a finish, 98 per cent 100 and 85 per cent 200 mesh. Capacity 40 to 60 barrels per hour. Power, 75 to 85 H. P.

Thus you see we have a unit of 900 to 1,500 barrels output per day, with a power expenditure of approximately 3½ H. P. per barrel per hour.

This is the largest unit of its type and yet is as accessible and as elastic as any plant of small individual machines which is full of complications, and a complete machine shop is necessary to keep it going.

The Sturtevant unit has been criticised by some men, who have given the matter no thought, on the ground that it is too big, too unwieldy. They say if something goes wrong the whole plant is shut down.

Let us see if this is true:

The ring roll mill of duplex design has each half absolutely independent of the other—one-half may be operated while the other half is at rest or is stopped for repairs. This feature enables the operator to reduce the workable size of the unit by half.

Again, what is there to get out of order or repair on the ring roll? Look it over—you will find no scrapers, pushers, plows, guides, screens, shields, balls or other parts of a nature needing constant renewal as in other mills.

Open the door, a matter of ten minutes, and you will find a large ring or tire and three rolls, and that is all the parts you can find that come in grinding contact with the material being ground.

This explains why there is practically so little wear. Because there are no other parts in these mills that come in contact with any material to cause wear.

Is it likely that the upkeep can be much under these conditions?

You need only to look after the ring and three roll shells. These parts are thick and hard and last a long time, because the ring runs at only 64 R. P. M. and the rolls have exactly the same surface speed, and when they need replacements it is the work of only minutes instead of hours to "open the door" and put new rolls on.

Ring rolls are continuous runners. Next, you have an elevator and two Newaygo screens to look out for. But you have an elevator in any case, usually several, plus conveyor systems that are needed for a multitude of small units; therefore, one elevator for a single great producer is not a complication.

Newaygo screens are continuous runners, too, for while the small parts of one screen wear out, yet duplicate parts may be easily and cheaply kept on hand so there is no delay in the whole system or stoppage while necessary changes are made in one screen.

Bear in mind, this is a comparatively coarse screening system and is therefore easy, for the separators have a great capacity on coarse work, and the large wire used for coarse screening renders them durable.

The tube mill is the only machine left, and is too well known to require description. You all know its interior parts consist of linings, replaceable once a season, and pebbles which may be replenished at intervals through the manhole. You will agree the tube mill is a continuous runner.

Shutdowns are expensive for a cement plant, particularly that ought to be relied on to operate continuously. This point is appreciated by every manufacturer. The Sturtevant unit is bound to be a continuous runner.

The cost of the Sturtevant unit is less than any other per barrel of production per hour—a whole lot cheaper.

The power is less—much less.

The upkeep is many thousands of dollars less, because it requires so few replacements.

Buildings are cheaper for they may be smaller for a compact unit.

In fact, no feature of this plant can be mentioned that is not better in theory and in practice than any other.

Cement manufacturers are appreciating this fact and are keeping the Sturtevant Mill Company, of Boston, Mass., busy building ring roll mills to meet the demand for big, economical grinding units.—L. H. Sturtevant.

SALESMEN'S CONVENTION OF THE EDGAR ALLEN AMERICAN MANGANESE STEEL COMPANY.

The salesmen of the Edgar Allen American Manganese Steel Company held their annual meeting in the company's offices at Chicago from May 14th to 16th inclusive.

The first day was devoted to a general discussion of the various subjects which make for the progress of the company. The second day was spent in thoroughly inspecting the company's plant at Chicago Heights, where all were given an opportunity to witness the actual production of "Stag" brand manganese steel castings. Great interest was taken in the many improved methods used throughout the foundry and in the operation of the splendid equipment of the company's new machine shop. After the trip through the plant the party was entertained at an enjoyable luncheon given in the company's lunch room, at which an interesting address was made by Mr. W. G. Nichols, vice-president in charge of operations.

On the following day the meetings were continued at the company's offices, when several interesting and instructive addresses were made. In the evening the salesmen and officers of the company were royally entertained at a banquet held in the English room of the Blackstone Hotel.

Those in attendance at the sessions of the convention were as follows:

W. S. McKee, vice-president in charge of sales.
W. G. Nichols, vice-president in charge of operation.
S. T. McCall, treasurer.
H. A. Hunt, eastern sales agent, New Castle, Del.
J. W. Plant, San Francisco, Cal.
F. E. Johnson, Salt Lake City, Utah.
P. M. Vilas, Minneapolis, Minn.
A. L. Maeder, Portland, Ore.
J. D. Hull, Seattle, Wash.
W. H. K. Bennewitz, Kansas City, Mo.
E. L. Pemberton, New York City.
A. H. Sherrerd, Scranton, Pa.
A. Whiteraft, Rochester, N. Y.
W. F. Irish, Boston, Mass.
E. S. Black, Chicago, Ill.
E. E. Crane, Chicago, Ill.
W. H. Evans, Chicago, Ill.
J. Dunlap, Chicago, Ill.
J. O. F. Clark, Jr., Chicago, Ill.
B. F. Clark, Jr., Chicago, Ill.
M. B. Meyers, Chicago, Ill.

FOR THE RETAILER

CHICAGO RETAILERS.

Chicago, June 21.—Dealers in builders' supplies throughout the city three months ago were somewhat fearful that building operations this season would not come up to the mark of last year. Developments in the last two months have dispelled all such fears. Building operations in the "loop" are surprising in extent and activity. Apartment buildings, flats and small cottages are being built in all parts of the city, requiring more building material than has been demanded at this time for many years in the past. It is claimed that the demand for brick this season is greater than it was during the World's Fair days. Contractors periodically have had their work held up for several days, not being able to get brick promptly delivered during the last month. The demand was too great for the visible supply; when this occurred dealers in builders' supplies also suffered proportionately, and were rushed to make up lost time for delayed deliveries when brick was furnished. Building permits for May and June show an increase in numbers and in valuation over last year's same period. Dealers in masons' supplies have had all the business in the last two months they could handle and there are no indications that this activity will be checked as the season advances. Conditions in the trade are satisfactory in every way with the exception of prices for material, which are claimed to be too low to allow a reasonable and living margin of profit.

All of the yards handling builders' supplies in the various sections of the city of the Wisconsin Lime & Cement Company have been exceedingly busy for the past two months, hauling material to jobs springing up in all parts of Chicago. It was reported at its main office in the Chamber of Commerce Building that building operations exceeded those of the corresponding period last year, which was a matter of surprise, as many permits were taken out at that time before the new building code went into effect limiting the height of buildings. Conditions are good and the outlook for a busy season bright.

C. B. Shefler, president of the Garden City Sand Company, said: "There is a greater demand for building material than usual, owing to the great activity in building operations, which surpasses that of former years. Prices, however, are too low."

"I had no idea," said T. M. Tobin, of the T. M. Tobin Bros. Company, 9326 to 9366 South Chicago avenue, "that the new lime house I built and which has been in operation for the last month would attract so much attention in the trade throughout the country. I have received many letters stating that a description of it had been noticed in ROCK PRODUCTS last April and among these inquiries was one from a Montreal, Canada, lumber and builders' supply firm, asking me to send them drawings and specifications. You undoubtedly have a surprisingly large and wide circulation. Yes, I sent them the drawings. As you know the construction of this lime house is from my own ideas and have proved to work out admirably. Some of my friends suggest I patent these ideas, but I have my own business to attend to without bothering with any other. We have been very busy for the past six weeks supplying the biggest demand for builders' supplies we have had in years. There is a scarcity of brick this season and its lack of prompt delivery halts the movement of all other material every few days, keeping us idle periodically. The demand for bricks is greater this year than it was during the World's Fair days. Buildings are going up everywhere in this territory and business is much more active than it was last year."

The E. C. Donnellan Lumber Company at South Chicago operate two yards, one at 88th street and Erie avenue and one at 100th street and Avenue H. The company commenced handling builders' supplies the first of this year, keeping its stock of cement, plaster, lime and a full line of masons' supplies at the latter yard. C. D. Russell, manager of the company, said they are specially pushing cement, torpedo sand and crushed stone of which they are handling great quantities this season. "Business is very brisk," he continued. "There is much building going on this season and the outlook as far as volume of trade is concerned is very bright."

The Calumet Coal & Teaming Company whose main office is at 9022 Commercial avenue has its facilities for supply brick lime, cement plasters and other masons' supplies taxed to a greater extent than usual at this time of the year, supplying material for building operations in the South Chicago district. They are exceedingly busy on large contracts for street paving, filling and excavations. It reports greater activity in building operations in the territory of their large yards at 95th street and Marquette avenue and 75th street and Bennett avenue than for several years in the past. While volume of business is gratifying, prices of material are too low for reasonable margins of profit.

Ringer Bros., who bought the coal yard at Cheltenham Depot of the Illinois Central Railroad last fall and put in a full line of builders' supplies, are doing a prosperous business. They were formerly in the ice business here for a number of years, are live wires and popular in Cheltenham. Hayden Ringer said: "There is a great demand this season for builders' supplies, buildings are going up everywhere and we have all we can do to supply this demand. Things are looking very bright and we are making improvements as fast as we can in our yard to take care of our increasing trade."

O. H. Hanson, manager of the Circuit Supply Company at 83rd street and Escanaba avenue, speaking of business said: "Last year was a good one, but this year is better, despite its being presidential year. There is much building done around here, stimulated by the erection of the Polish church at 84th street and Saginaw avenue. For blocks around the church small residences are being built." This company makes a specialty of the plasterer and plumbers' trade, concrete foundations and side walls. The Hanson-Undine Company, contractors for general cement construction, has its office in the same building as the Circuit Supply Company. It makes a specialty of Portland cement sidewalks and has taken a large number of contracts laying them in South Chicago. A. F. Hanson is president of both companies.

E. E. Wetzhold, manager of the F. Schultz Lime Company, 653 West 16th street, spoke very optimistically of the outlook for business this season and said while the volume of trade was larger than last year there was less money in it on account of low prices.

Walter L. Wards, president of the Standard Material Company at 66th street and Lowe avenue, is building a model barn across the street on Lowe avenue, opposite the yard, which will be ready for occupancy the first of next month. It possesses sanitary and economic features of great value. It contains 51 stalls for horses on the first floor and 23 stalls on the second floor, to which horses gain access by an easy ascending runway on the outside of the barn. There is one stall on the first floor called the hospital stall, used for sick horses, the floor of which is some six inches lower than the others to permit its holding warm water for horses with sore or injured feet to stand in. The ventilation system installed here is the same as that installed in the modern hospitals and model stock farms of the country. The floors throughout the barn are of concrete. The second floor contains a spacious hay and grain loft and oat bin capable of holding three carloads of oats; the bottom lined with zinc sheets slanting to the center, from which a chute runs to a crusher below on the first floor, where the oats are ground. This crusher is run by electricity. A Sasgen swinging derrick on the roof over the hay and grain loft is used for raising the feed to the loft, a marked improvement over the old fashioned pulley. The stalls are equipped with steel hay racks and feed boxes manufactured by the Rockford Steel Fixtures Company of Rockford, Ill. These hay racks are so constructed that a horse gets whatever hay he desires to eat, without wasting any, which in nosing in the old wooden manger a quantity was strewn on the floor of the stall and wasted. Mr. Woods estimates a saving in the use of this hay rack will amount to about $15 a horse in a year. The barn also contains an up-to-date blacksmith shop, stock room and pleasant room for superintendent of barn.

The Standard Material Company has been more busy than usual at this time of the year hauling builders' supplies to the many two and three story flats which are going up everywhere in its territory. It has been inconvenienced much lately, not being able to get brick promptly. Mr. Wards said: "I have promoted a new enterprise—the South Side Brick Co., capital subscribed and land selected. It is at Crown Point, Ind., on the Erie and Panhandle railroads and the Gary & Southern Electric road. The brick plant will be in operation by next November. The entire output of the brick plant will be taken by the Rockwell Lime Company and the Standard Material Company.

The Tuthill Building Material Company at 231 West 63d street, the Lake Building Material Company at 47th and Leavitt streets, the Union Coal, Lime and Cement Company at 5840 Ashland avenue, the branch yard of the Templeton Lime Company at 358 West 59th street and the Chicago Contractors' Supply Company at Loomis boulevard and 59th street all reported great activity in building in their neighborhoods the last two months and a correspondingly large demand for builders' supplies which kept them more than usually busy, but complained more or less about small margins of profit.

Astrid S. Rosing last month bought the business and builders' supply yard of the M. A. Staley Company at 1128 Cornelia avenue. H. A. Diestel, who was J. D. Wigginton, Jr.'s, manager at Evanston for four years, has become the manager for A. S. Rosing's new yard. He is well equipped both by experience and popularity in the trade to take care of the needs of the masons and plasterers to which this yard has catered for years. He is well known among the contractors of Evanston and Chicago. A larger stock of builders' supplies will now be carried in this yard than formerly. He reports business very brisk and great activity in building circles. Mr. Staley retired from business after a successful career of many years on account of bad health. A. S. Rosing is an extensive dealer in sewer pipe, fire brick, sand, gravel and clay products, with offices at 1401 Harris Trust Building, Chicago.

J. J. Croake Company, 2931 Fullerton avenue; the Templeton Lime Company, at Homer and Grand avenues, N. J. Druecker & Co., 2635 Artesian avenue; the Waukesha Lime & Stone Company at Devon avenue and Sheridan road, and Henry Frerk Sons, 3135 Belmont avenue, reported that there was building going on in their respective territories and for the past six weeks had had a decidedly larger balance of business than last year at the same period, but that the margin of profit was cut to the bone by reason of prevailing low prices for material.

Morris Koch of Koch & Lambe at 4605 Armitage avenue in the town of Cragin said: "Volume of business is greater at this period of the year than it has been for some time. Building operations in this territory are far more active than in past years and is rapidly filling up with small residences of one and one-half story cottages. The John M. Smyth Company has recently purchased 15 acres of ground adjoining the St. Paul railroad tracks, a few blocks west of us, will put up a large furniture factory which will bring hundreds of families around here and still further stimulate building. Everything looks bright with the sole exception of low prices for material.

Geo. T. Carpenter one month ago moved one block west to 41st avenue and West Taylor street, where he occupies three times the ground of his old yard. On the northeast corner of his yard he has erected a modern brick office building fronting both streets. This summer he opened another yard at West 47th and Leavitt streets. In these yards he carries a large and full line of sewer builders' supplies, including sewer pipe, flue linings, wall coping, fire clay partitions, sand, cement and sectional patent catch basin blocks. He manufactures catch basin covers and practically has furnished all that are used in Chicago. His 41st avenue yard is on the Baltimore & Ohio railroad and the Chicago Terminal. His team tracks, running alongside these roads, enables him to unload all material from cars by roller skids. Carpenter is a live, wide awake hustler and the business he now controls requires the room of two yards and a large force of men to handle it. He reports business excellent and rapidly increasing.

Geo. W. Parks, president of the Chicago Clay Products Company, abandoned his old yard at 43d avenue and secured ground on South 40th avenue and West 24th street, adjoining the tracks of the Chicago, Burlington & Quincy railroad. He has here 30,000 square feet of ground with a switch track from the C., B. & Q. road accommodating six freight cars, running to the door of the new warehouse. The company carries here a full line of building material, which by reason of its location and splendid facilities it is enabled to insure prompt delivery to jobs in that part of the city.

The Idealite Company, of Rockford, Ill., has been incorporated with capital stock of $2,000 to do a general contracting and construction business. The incorporators are Clarence E. Farr, Newton J. Smith, Jr., and Mary Travers Smith.

The Paul Brothers Company, of Cleveland, Ohio, has been incorporated with capital stock of $10,000, to do construction and building. The incorporators are Charles J., Clara B., Edward W. and F. C. Paul and A. Schoenberg.

The Continental Building and Construction Company, of St. Louis, has been incorporated with a capital stock of $10,000. The incorporators are A. F. Lieby, J. G. Loescher and H. O. Loewe.

PITTSBURGH RETAILERS.

To look at Pittsburgh a stranger would easily get the idea that the town was on the boom. There are decidedly more projects of the really big variety going forward or on tab than for several years. First, of course, in this list comes the hump removal which is now a surety for large steam shovels, dynamite, blasting, steam drills and all the latest appliances for moving dirt and rock in a hurry are to be seen on Fifth avenue, between Smithfield and Grant streets, right in the heart of the city. A square away three big churches are being torn down, while along Grant street, Webster avenue and several of the adjacent streets and alleys old buildings are being razed to make a place for new structures that are to follow the big improvement. What this will mean to Pittsburgh it is hardly necessary to say, for leveling several squares of a business section can not but be a big incentive to the erection of high class buildings. A figure of $2,000,000 is regarded as conservative for the total cost of this work and the immediate improvements that will have to be made, not to mention the erection of any costly buildings.

The Point bridge project, the South Hills tunnel (which will be decided in a few days), the filling of the North Side streets and also the West End thoroughfares, and more work on the filtration plant, together with the city group plan and the market house projects, are all big improvements that interest keenly the dealer in builders' supplies. Ordinary street work in Pittsburgh has not shown up as well as was expected. Contracts are late in letting. This is the chief objection made by dealers, for the outlook is very promising. All through the tri-state territory street improvements are going forward on a large scale. Although builders' supply dealers are not rushed with business, in general they report things much better than one year ago and in every respect, except house building, this seems to be the case here.

Evan Jones, aged 71, a very well known contractor, died at his home, 2602 Boquet street, Oakland, May 28th, of rheumatism of the heart. He was born in Wales and came to America when ten years old. After thirty years in the plastering business he formed the Evan Jones Company, brick manufacturers. Their offices are at 36th street and Liberty avenue, and the quarries are in the Ligonier Valley at Gray Station on the P. R. R. His two sons, Daniel E. and Evans Jones, Jr., were in business with him.

Keller Brothers, from the East End, report business very slow in that locality, especially house building. Their specialties are cement, lime and plaster, which, of course, are badly hit by this lack of building.

Knox, Strauss & Bragdon say that business is fair to good and considerably ahead of last year. In street work they are getting a full share of the orders that are going around.

Houston Brothers Company report its sewer pipe business as exceptionally good. In fact, nearly all their lines show a gain in demand and orders and prospects are regarded by them as O. K. for fall trade.

The Builders' Supply Club of Pittsburgh held its regular monthly meeting Tuesday evening, June 11th, at the Fort Pitt Hotel. In addition to a splendid social time, some excellent talks were made by the different members. The club now has 22 members, and is justly rated as one of the liveliest and most aggressive commercial organizations in Greater Pittsburgh.

The Greater Pittsburgh Retail Lumber Dealers' Association will hold a joint picnic with the Pittsburgh Wholesale Lumber Dealers' Association June 22nd, at Keystone park, on the Butler plank road. George N. Glass and A. J. Diebold are a committee to work up plans for the retailers. A ball game, barrel and sack races, running and jumping bouts, etc., are always features of this event, and this year promises to be a record-breaker.

Builders' supply men were much in evidence at the recent Knights Templar state encampment here. The city was beautifully decorated and many builders' supply concerns had their place of business fairly covered with bunting and Masonic emblems.

At the regular meeting of the Manufacturers' & Contractors' Club in the Lewis block May 29th, contracts recently awarded in the Pittsburgh district were discussed and reports were received of plans being prepared for many small buildings. An amusement committee is now busy getting ready for the annual picnic of the club, to be held June 29th. The club has also been much interested lately in the recent decision of the State Supreme Court declaring an act of 1901 unconstitutional in that a lien was deemed valid from the time work was commenced on the contract. The court tells that the lien should become valid only at the time it is filed.

LOUISVILLE RETAILERS.

Louisville, Ky., June 18.—The biggest May that the Louisville building world has ever known has played its part in boosting the stock of the building supply merchant many points above par. As a matter of fact, there isn't a man in the local trade who would give up his position in the race for 1912 business for any consideration of money, marbles or chalk. The situation looks too good for that.

The weather which has graced the Falls Cities during the past month has been enjoyed as weather was never enjoyed before hereabouts. Bright sunshine has been the rule rather than the exception —and for weeks prior to May 15 it was the exception rather than the rule. Consequently the tremendous amount of building which is in blue-print embryo in these parts is just now getting fairly started toward the middle stages of execution and the final stages of completion. All sorts of supplies, from steam pipe covering to roofing and cement, are in excellent demand and promise to remain so for a number of weeks.

The biggest May that the building world in Louisville has ever known kept the offices of Building Inspector Robert J. Tilford as busy as a big beehive during the month. A total of 259 permits was issued, calling for work valued approximately at $531,862. This figure eclipses all others which have been set for the month of May in the annals of the inspector's office. In May, 1911, 253 permits were issued, but the aggregate value of the work which they called for was only $319,340.

Everybody identified with the building trades in Louisville is pulling hard for the fiscal year of 1911-1912 to out-distance that of 1910-1911 in the matter of building permits and the total valuation of those applied for. If this feat is to be accomplished, an average of $600,000 worth of building must be approved each month from now until Auguts 31, when the fiscal year of the municipality closes. The term of 1910-1911 was the most auspicious in the history of the inspector's office, providing a record-breaking volume of work, and it is conceded that the interests which are furnishing the current building boom in the Gateway City will have to travel some in order to out-distance their last year's record. At that, the coup is not only possible but probable.

The newest building supply concern to grace the Falls City field is the W. H. Paine Roofing & Furnace Company, which has been incorporated only recently. The new company will handle a general line of roofing through this section and will make a specialty of domestic furnace work of all kinds. The W. H. Paine Roofing & Furnace Company is incorporated with $1,000 capital stock, divided into shares of $10 each, with a maximum limit of debt of $500. Its incorporators and their individual holdings follow: W. H. Paine, 60 shares; Morris Paine, 30 shares, and Susan Paine, 10 shares.

That material improvement in the Louisville supply trade, especially so far as its wholesale department is concerned, has developed during the past month is the belief of L. M. Rice, Jr., president of the Central Paint & Roofing Company. The receipts of the Central Company in its jobbing department have multiplied themselves once again during the month. Beaver board is proving to be a particularly popular material with the Bluegrass building fraternity at present, for the introduction of the goods filled a long-felt want that has existed with Kentucky home builders who are essentially lovers of sanitary and artistic stuffs.

The National Roofing & Supply Company is just working into the midst of what promises to be one of the busiest warm weather schedules that has ever been developed under the eye of Manager Edward Streicher. Business with the Main street supply headquarters is pronounced to be immeasurably better than at this time last month, and with the establishment completely renovated and supplied with an attractive exterior finish made of composition roofing, everything is shipshape for whatever there is to come.

A big tobacco warehouse owned by the American Tobacco Company at Hopkinsville, Ky., is keeping a force of roofers busy under the direction of the Samuel F. Troxell Company, according to the report of that concern. Mr. Troxell has visited his upstate job several times during the month and is pleased with its progress, while work which he has in hand locally for the Kentucky Electric Company and the Louisville Railway Company is doing just as well as ever.

The Eldred Development Company, of Peoria, Ill., has been incorporated with capital stock of $50,000 to construct tracks, bridges, houses and other structures. The incorporators are O. G. Leach, C. C. Orange and R. D. Clarke.

ILLINOIS RETAILERS.

Springfield, Ill., June 21.—Building permits for May, which aggregated $120,292, will show a small increase over the same month last year. The record for June will be more satisfying, as construction started off with the permits and letting of contracts for the new Y. W. C. A. building for $56,000 to the Fitzsimmons & Wheeler Construction Company. This firm recently embarked in the retail business and will have a nice dual contract. Joseph Lorscheider will build the new building of the Sangamon Electric Company for $20,000, another June project. Nelch & Son, who also are contractors and retailers, received the Eleventh street paving for $1.75 a yard for brick paving and $.55 for stone curbing. Richard Egan was given contracts for paving on College street and East Lawrence avenue.

The Illinois State Board of Administration has received plans for a new $40,000 cottage to be erected at the agricultural department of the hospital for the insane at Bartonville. W. Carby Zimmerman, state architect for the board, is drawing plans for a $50,000 cottage at the Watertown hospital, and will follow this work by designing a new amusement hall for which the legislature has made an appropriation of $25,000. The board has awarded the contract for paving South State street in Elgin, alongside the state hospital buildings, to the Logan & Giertz Construction Company, of Elgin, for $35,000.

W. E. Fry, of Freeport, is planning to have his office building on Stephenson street enlarged at a cost. of $50,000.

Voters of Urbana have approved a proposition to issue $75,000 in bonds for the construction of a new high school.

Riester & Rubach, architects, East St. Louis, Ill., have plans for a new $30,000 school building to be erected on East Second street, East St. Louis.

E. H. Farris, of Morning Sun, Iowa, was the lowest bidder on the Broadway paving job at Pekin. His bid was $1.65½ for Barr brick; curbing 27 cents, and protection curb 24 cents.

Hoffman, Townsend & Hoffman, of Mt. Carmel, Ill., will build three miles of brick road on concrete base with stone curb near Danville, their bid of $62,300 being the lowest of six considered.

Hard road improvements will begin soon near Carbondale, as voters were two to one in favor of borrowing $35,000 for that purpose.

The city council at Rockford has voted to pave Harlem avenue with brick at a cost of $71,000.

A bond issue of $10,000 has been voted in the city of Washington, which will give that municipality about $50,000 for new paving and sidewalks.

The newly organized Tallula Lumber Company of Tallula expects to be ready for business with new sheds, accessible to railroad tracks, by September 1. The following officers have been elected: President, C. W. Houghton; vice-president, J. C. Bokere; secretary and treasurer, C. J. Savage.

J. D. Arnett will continue the tile business at Gibson City, W. W. Outlaw & Son having decided not to renew their lease.

The retail firm of E. Zimmer & Company at Pekin has become Zimmer Brothers. Ed and John Zimmer, sons of the late Emke Zimmer, are the partners, Andrew Heilman, who was associated with the elder Zimmer, retiring.

The Paisley Elevator and Lumber Company, of Witt, has purchased the yard of the Alexander Lumber Company at Witt and will consolidate the two. C. E. Bathe, who has been manager for the Paisley company, will continue as manager.

Kitch & Eubank, of Ellsworth, suffered a loss of $5,000 June 1, when one of their lumber sheds was destroyed by fire.

W. A. Bowers, manager of the Southern Illinois Lumber Company, has been elected secretary of the newly organized Commercial Club at Albion.

Charters for Illinois retailers have been issued from the office of the secretary of state here as follows:

Bement Lumber Company, Decatur; capital stock, $1,000; dealing in lumber building supplies, tile, etc. B. F. Huff, R. B. Jones and W. J. Huff.

Sadorus Lumber Company, Decatur; $15,000; dealing in lumber, builders' supplies, tile, etc. W. J. Huff, B. F. Huff and John Mara.

Roberts Farmers' Grain Company, Roberts; $10,000; dealing in, among other things, lumber.

J. G. Supple Company, Danville; $15,000; dealing in building material, lime, cement, lumber, etc. James G. Supple, G. M. Vollman and T. J. Wright.

Farmers' Elevator Company, Alvin; $7,000; dealing in, among other things, tile and building materials. J. R. Carter, F. O. Farrell and P. P. Graham.

Changes which have been recorded in the office of the secretary of state are:

Gleaner Coal and Lumber Company, Grant Park, increased its capital stock from $2,500 to $10,000.

Fairfield Lumber Company, of Fairfield, increased its capital stock from $10,500 to $20,000 and the number of directors from three to five.

Granite City Lime and Cement Company, Granite City, increased its capital stock from $80,000 to $100,000.

W. S. Logan, of Paris, Ill., who supplies Eastern Illinois and Western Indiana with cement and lime, is an expert judge of horseflesh and buys horses and mules on the side.

The E. W. Houghton Lumber Company, of Galva, Altona and other Illinois towns, gives its patrons a big dinner each year.

E. L. Conkling, of the Conkling-Reuling Company, Pekin, Ill., believes in advertising novelties. He gave a man a lead pencil once, sold him an initial order of $100, kept him coming in for little lots for years and then got the contract from him for a city residence.

The Terry Lumber Company, of Galesburg, Ill., announces it conducts a "lumber yard department store."

"We don't get rusty in the concrete business as we work at it every day, winter or summer, rain or shine," is the boast of William Lough & Son, Marion, Ill., dealers in all kinds of rock and concrete products.

NEW YORK RETAILERS.

New York, N. Y., June 13.—The local building material situation may be described as routine as the past month has failed to bring with it anything of an interesting character. The demand for materials was of a hand to mouth nature. The Borough of Brooklyn has been receiving the majority of building materials during the past two months. Building there is progressing rather briskly in the suburbs in the form of two family houses. Although a large amount of work has been let out of late in Manhattan and other sections, dealers report that these operations will not be in the market for materials until the fall months, when they look for a heavy demand to materialize for all kinds of materials.

The demand for Portland cement has been good and steady in the local market during the past month. A number of mills are not operating at present, and those that are active are working under their capacity. Stocks in the bins are being worked off and the amount of cement on hand is smaller than it has been for some time. These conditions have had a good effect on the cement market and have also improved the prospects for a good fall business.

E. B. Morse, of the Frank E. Morse Company, had the following to say regarding the local building materials market: "We have experienced a fair demand for building materials during the past month, but up to the present time the call for materials has been below normal. While the demand for cement, lime and plaster was not heavy, it, however, continued steady. Work, which had been discontinued on account of the inclement weather during May, has been started during the past two weeks, and from now on we look for a good amount of business to come to hand."

William C. Morton, of the Consolidated Rosendale Company, speaking in regard to the building material market, said: "The demand for Rosendale cement continued to be of good proportions during the past month, and the greater portion of our goods are delivered in Brooklyn where extensive building operations are in progress, especially in the suburbs. Many new building operations have been started in this vicinity lately and the Borough of Manhattan will get the biggest slice of the work. Dealers also report that the demand for all kinds of building materials at present is a trifle slow, but from indications of the work just started prospects for future business is very bright."

G. A. Molitor, of the Northampton Cement Company, spoke as follows in regard to the local cement trade: "Nothing of new interest occurred in the local cement market during the past month and the demand, while not large, was of steady proportions. A number of mills are not in operation at the present time, but are working off the stocks of cement in their bins. However, stocks are being worked off gradually and it is reported that the amount of cement is smaller than it has been for some time. This state of affairs has created an improvement in the undertone of the market and tends to make the prospects bright for fall business."

S. Wells, New York representative of the McCormack Waterproof Portland Cement Company, reported that orders for their cement are coming along nicely and that lines are out for a number of large sized contracts which they expect to land shortly. Many concerns have been interested in the use of the waterproofing compound and they have been highly pleased with the results obtained. Many architects are specifying our product, as they realize that our waterproofing cement is just what we claim it to be.

The offices of the McCormack Waterproof Cement Company have been removed to the Singer building, 149 Broadway, New York City.

P. Austen Tomes, publicity manager of the Atlas Portland Cement Company, has recently undergone a successful operation for appendicitis and is now on the road to recovery. It is expected that he will be at his desk in the early part of July.

SAN FRANCISCO RETAILERS.

Building operations are very active in San Francisco, as well as in other leading cities of the Coast, the volume of work in many places being well above the average. There is also an unusual amount of substantial construction under way in the smaller towns, owing to the fact that agricultural industries have been extremely prosperous for several years past. Public work is an important item everywhere, and new plans are coming out every week for schools and other Government and municipal buildings, in addition to numerous sewer construction and paving contracts.

Notwithstanding this apparent activity, individual retailers of building materials are not altogether satisfied. Things are better, they say, than for many months past, but with close competition among dealers and manufacturers the improvement is not as rapid as could be wished.

Several new firms are taking up the retail material business in various parts of the state. The Diamond Match Company, which has large sawmills and retail lumber yards in northern California, is putting up sheds for lime and concrete materials on its yard at Maxwell, Cal., and S. G. Beach, a lumber dealer of Placerville, Cal., is branching out into other materials and is handling Mount Diablo Portland cement.

THERE'S MONEY IN THIS FOR YOU.

The title of this article was the headline of an advertisement I once read, and that line could well be placed at the head of a good many ads, but it is just as applicable to a bit of news.

Did it ever occur to you that the three shell game is being worked every day, and that the man with a bogus gold brick does not need to look long before finding a sucker, and the gold brick sucker must be something more than an ordinary jay. He must be a man of wealth, for it costs from $20,000 to $30,000 to get into this game, and a man raised in the city is as liable to be the victim as the man from the country.

There is not a scheme hatched out to gull the farmer but what the farm papers have exposed time and again, and yet every day some farmer gets bled by one of these games.

Why? Because he does not read his farm paper, and perhaps does not take one.

Now let us turn to the merchant. He has his class paper that tells things of interest to his trade. The publishers of this paper keep track of the swindles that are worked, with the merchant for a victim, and if the merchant has not listened to what the publisher has been trying to tell him no one should lose sympathy on him.

Today every trade has a publication devoted to that particular trade. The publishers of these papers are ever on the alert to provide their subscribers with the latest news in that line. Any fraud that is worked in that trade is known and written up by the publisher, and more frauds would be written up, only the man who gets stung often prefers to swallow his loss with his chagrin rather than let his acquaintances know that he has been taken in by a very simple trick.

I heard a conversation once between a canvasser for subscriptions for a trade paper and a so-called business man. As I remember it was something like this, commencing with the agent:

"What papers do you take?"

"Oh, I take the town paper and the Omaha Bee."

"I meant what trade papers do you take."

"I don't take any, young man, and I don't want any. What do you suppose your editor sitting up there in Chicago can tell me about this business that I have run for thirty years and know all about?"

This was a poser, but the agent started in again to tell about the markets, the crop conditions throughout the country, and methods of doing a retail business. When he had gotten this far the dealer broke in with:

"That will do now; the markets may be all right, but the price lists from the wholesalers tell us about them. Crop conditions I don't care a thing about, for our business is strictly local; but when you come here and try to tell me about methods in doing business, that's the limit. Don't you suppose I know more about methods in doing business than any long-haired galute that writes stuff for your paper?"

This was a clincher, but my friend the subscription agent took another tack. "My friend," said he, "you are just the man we want. You have the business down pat. Now, just put some of your ideas on paper and we will pay you for them; or, if you prefer, just show me about your place and let me catch onto your methods and I will write them up myself." But this did not work, either, and we went away and for ten minutes my companion did not say a word. Then he said: "If I live I am going to put a first class con man onto that chap; it is the only thing that will wake him up." I think he was right.

A LONG TIME AT IT.

Oldtimers in Springfield, Mass., are familiar with the name of T. Shea for the reason that it has been a long time before them. Newcomers know T. Shea because he is a progressive merchant; in other words, a live wire as a dealer in mason's supplies.

At the time of my visit to Springfield, Mr. Shea was out of town, but I had the pleasure of meeting Mr. J. T. Foley, the manager of the business, and also Mr. J. E. Hays, who represents T. Shea as outside man in Springfield as well as in western Massachusetts. Mr. Hays was formerly with the U. S. Gipsum Company and only recently came with the Springfield concern, it being only recently that Mr. Shea decided to reach out into the smaller towns and take on a little more of the wholesale trade.

Mr. Foley is a good listener, and if there was a dollar in it for the company I am sure he would be a good talker. He says he is a better listener than a talker. I am not so sure about that, but when he does talk I am well aware that he talks very much to the point. I did not ascertain his politics, but in business he is a progressive.

Mr. Shea did business in Springfield when it boasted of only 20,000 population, and now that the figure has reached the 100,000 mark, or about that, he has the satisfaction of knowing that he has been keeping pace with the town.

The Office.

The office at present used by Mr. Shea is quite in keeping with the advanced condition of the business, as well as the city. It is located in the center of the business district, is finished in hardwood, well furnished, and is high-studded enough to admit of both light and air abundantly.

I could not help but remark this, as it has always been a puzzle to me how a business man can content himself in an office without making it as pleasant and convenient as possible, for it is the place where he spends more than half of his working hours, and in my estimation pleasant and agreeable surroundings make pleasant and agreeable people. Many dealers, especially dealers in mason stock, seem to think because the stock they handle soils other things that it comes in contact with that their office must be correspondingly dirty. I not only think the office should be comfortable, pleasant, light and airy, but somewhere, either outside or inside the office, I would show samples of some of the material I dealt in. Any office can have a fireplace. Why not have one, and have it built so artistically that someone else would want one? Tell your mason customer to bring in his customer and let him see how that kind of material works up. There are several articles that the dealer in mason's supplies has to sell that can be advertised to advantage in this way.

The Best Asset.

Mr. Foley, who holds down the head desk at the office of T. Shea, says that the best asset he finds in the business is prompt delivery and keeping his promises with his customers. I had not thought so much what this means to a contractor until Mr. Foley reminded me that journeymen masons were high-priced men and must have material promptly.

When a dealer tells a contractor that the stock will be delivered at 9 o'clock, if the material is not on hand the contractor is liable to a loss, as he cannot hold men there without paying them.

Another point Mr. Foley spoke of was the incentive there is to a dealer to say over the phone that the stock is on the way when in reality it is not loaded. Avoiding this, and doing as he agrees about delivering stock, is, according to Mr. Foley, the thing that helps to weld the customer and the dealer together.

It certainly is a good point, but the dealer in

mason's stock is not alone in this. Merchants in other commodities have the same incentive to stretch the truth in order to keep their customers from burning up the telephone wires, but it is wrong from a business point of view, however much a man might be able to ease his conscience over the moral wrong.

Holding Invoices and Freight Bills.

I find that it is the usual thing among most of the dealers that I have talked to not to return either invoices or freight bills. Mr. Shea has his checks made showing a form on the face of the check with spaces to be filled in showing what the check is paying for, the amount, freight and discount. In this way all papers pertaining to the transaction are at all times in the hands of the buyer. If a check is sent in payment for material the company that receives the check is notified to return the check if not correct.

Auto Trucks in the Business.

There are most likely fewer auto trucks in the mason's supply business than in any other heavy teaming line. This was explained by Mr. Joseph C. McVeigh, of the H. C. Puffer Company, in this way—that the auto truck could only replace the horse for teaming in the long hauls, and that most of the mason's supply business meant short hauls. I am looking for someone to controvert this, but I do not care to do it myself, as Mr. McVeigh's point seems well taken.

EMPLOYER AND EMPLOYEE.

The success of a business depends to a great extent on the relations between the employer and employee. I am reminded of this by a conversation I had with a gentleman who was relating his experience with a former employee. This employer, who I will call Mr. Scott, had what would be called in the business world peculiar ideas in regard to the people in his employ.

For instance, he believed in paying his people enough so that the employee would think he was being paid more than he was worth. He argued that any employee who worked for the interest of the company would try very hard to earn the extra salary.

Another of Mr. Scott's ideas was that he did not want anyone working for him who did not by his own exertion get into the line of promotion. If he hired a young man at $15.00 per week and at the end of two years that young man was worth no more than $15.00 a week he would call him into his office and say to him: "Young man, when your week is up you had best look for another situation."

"But, Mr. Scott, don't I earn what you are paying me?"

"Yes; but I don't want a man in my employ that cannot improve. You have been with me two years now and should be earning $25.00. Instead, you are only earning the $15.00 we pay you. You are really standing in some more progressive man's way."

This was a new idea to me, but I am not at all sure but that it is right. There are too many employees that base the amount of work they do according to the pay they receive, and, doing this, an employer never knows how much more of a salary they are able to earn.

I have always been of the opinion that the average employer appreciates the value of his employees, and if he does not someone else will.

In this up-to-date age many of the large companies who have several salesmen on the road call them all in once or twice a year and have a general consultation in regard to the condition of business. Then they have an experience meeting where the different salesmen tell their experiences with customers. Then the sales manager or someone whom he has secured for that purpose gives a lecture on salesmanship. After this there is most likely a little spread, and the salesman who can talk better while sitting down exchanges experiences with his fellows.

An employer can hardly expect an employee will take an interest in his business unless he takes some interest in the employee. The trouble with many employers who only employ a few men is that they do not use the methods that the larger concerns find necessary. While it is true that they will talk with their men they do not make a business of doing it. They may have a little talk once a month, or once in six weeks, just as it happens, but the proper way would be to appoint some special day each week, or twice a month, to get the people together and go over the business with them. There are many things to educate employees on, and while this educational proposition is going on it would be a very dull employer who could not learn something himself.

A salesman came to his employer the first day of the month and said: "Mr. Blank, I have sold twice as much material this last month as I did the month before." Then he put on a self-satisfied look, as much as to say, "Ain't I worth more money to you?" But the employer had seen the bookkeeper first, and said: "While what you say is true, did you know the profit on your business last month was not as much as it was the month before?" This employer had not spent enough time in instructing this salesman in real business. The salesman had not been told that any chump can give goods away but that it takes a salesman to make a profit.

An employer need not give his business away to his salesmen nor to any other of his employees except his bookkeeper, but he should educate his salesmen in a few things such as the value of time, that large sales are not so much to be desired as large or reasonable profits, and a few other things to interest them in the success of the business.

SYSTEM.

At Worcester I called on the B. F. Marsh Company and found Mr. Marsh on the point of doing downtown. He expressed his pleasure in meeting a representative of ROCK PRODUCTS, put off his downtown trip, and gave the writer every attention.

System is a hobby with Mr. Marsh, and if a business man is to have hobbies this is the best one I know of to begin on.

I often call at a man's office and am told "We cannot give you any pointers on business or tell you how to do it, because our business is the same as the business of a world of other business men," and they are honest in thinking so; but it is not altogether a fact. There are hardly two companies in the country who carry on business exactly alike, even though the kind of business is the same, and they are often surprised when I show them that they are doing certain portions of their business different and often much better than their competitors.

When I told Mr. Marsh what I wanted he had no excuse of this kind, but said: "I will show you the way we handle our business, and, although you may have seen it all before, I am pleased to present it, and if you can find anything that is new to you you are welcome to it."

I knew I was keeping Mr. Marsh from going downtown and did not take the time I wanted to with him, but I am going to tell of a few ideas that this company is putting into practice that seem to me to be good ones for other customers to emulate.

Ordering Material.

First let me begin with his method of ordering material. It makes no difference whether an order is sent off by mail or given to a solicitor, the order must be made out in triplicate on the order blanks of the B. F. Marsh Company. This order is given a number, and as long as any of that stock remains unsold that order number sticks to it.

Keeping Track of Stock.

When that order has been filled and received by the B. F. Marsh Company the amount of the material received is put on a card printed for that purpose. Let us say this is a car of lime. The record of this car is written on the lime card; the date of the order, the order number, amount ordered, date when received and amount received. There are two columns more, one for amount delivered, the other showing balance of lime on hand. The record of all lime received (of this kind) is kept on this card, and by looking at the card file the amount of any article kept by this company can be ascertained. There are tab cards that show at a glance the proper cards to take out to show the amount on hand of any particular material.

Economy in Handling.

One of Mr. Marsh's ideas is to do a good volume of business with the least amount of labor. For this reason he has his sheds or warehouses built alongside of the railway tracks, has the latest up-to-date unloading devices, and all material is taken out on the other side of the sheds on teams. Of course there are many dealers who do the same, but these sheds, while they take up a good deal of space lengthwise of the tracks, are narrow, so that in either unloading from the cars or reloading onto wagons there is no need of handling the stock but a short distance.

Books and Bookkeeping.

The business of this company was established in 1888 and incorporated in 1911. It is like a good many other institutions in one way; it has grown from a very small business to a very extensive one, and I mention this for the reason that the system that is now in operation was built up with the business, and the books and bookkeeping are made to fit the business.

One book Mr. Marsh showed me was unique, at least it seemed so to me. It was a record of checks paid out. On the pages of this book is shown a column for each article bought. These columns are kept footed up and brought forward, and at the end of the year the exact amount of money paid for any purpose can be seen at a glance. For instance, if you keep a book of this kind and want to know how much salary, or how much money you paid for lime, or cement, or plaster board in the year 1911, all you need to do is to glance at the footing of the proper columns.

When a bill comes into this office for material bought it is checked up and, if found correct, is marked the date it must be paid in order to secure the discount, and these bills are put in a place for the attention of the bookkeeper. After they are paid they are filed away. This is a peculiarity of this company; they never return the bills with the checks sent, but there is a record of the transaction on the back of the check. I don't know as I can understand the benefit of keeping the bills unless it is to have the whole business uniform, as some firms in receiving a check return the bills stamped paid, while others send a receipt for the check.

All wholesale orders taken by this company are signed and taken in triplicate. City or retail orders are handled a little differently, but they are handled on the triplicate tickets. When these tickets are entered on the books the gross profits are shown, and at the end of each month the total expenses are figured and taken out of the gross profits. All such expenses, such as taxes, insurance, etc., that are paid by the year, are divided into twelve parts and charged monthly.

All invoicing is done on the typewriter, and the second sheets used are loose leaf sheets large enough to take copies of four invoices. The copies are then kept in covers, which makes a much more handy reference than if they were each kept on one sheet the same size as the invoice. A few pages of this invoice copy book are used to keep track of the gross profits on all of the invoices, and it is here that the total gross profit for the month is found, and from which the monthly expense is subtracted.

Keeping so exact a system was recently the means of showing this company a leak in their business and of stopping it, but it was an unnatural leak such as too often comes when confidence is abused.

Advertising.

Advertising is another part of the business that has not been neglected by this company, and copies of all their advertisements are on file in their office. One of their schemes is to send out a card each month. These cards are not exactly regulation post card size, nor are they altogether tame in the text, but they are of a kind that are apt to make the ones who receive them sit up and take notice—and that is the keynote of advertising.

Recreation.

Mr. Marsh has always been a hard worker, and, building up his business as he has, is familiar with every part of it, but he believes in recreation, though the recreation that he chooses would not be considered recreation by some.

The winter is, of course, his dullest time in business, and he takes that time to go out among the brick and lime kilns, the cement works, the tile factories and all other places where the material he deals in is manufactured, and while he is learning something about his business he is taking his recreation. Like all other progressive men, Mr. Marsh would like to feel that his competitors are progressive as well, as he believes the best competitors to have are the ones who know the amount of their expense in doing business.

The Personnel.

The active members of the B. F. Marsh Company are B. F. Marsh, president, and R. H. Whitney, vice president and treasurer—a live, up-to-date company which it is a pleasure to visit.

A Trade Mark.

Mr. Marsh, like many other progressive dealers, believes in a trade mark, and not only believes in having a trade mark, but he believes in using it, and it can be found on all of this company's stationery.

The design is a shield. On the top is the picture of a hoe and a hod. Then come the figures 150. Underneath this the name B. F. Marsh, after which are shown barrels of lime, sacks of cement, a few brick and a piece of drain pipe.

I studied it all out but the figures, and was told, with a small share of justifiable pride, that the 150 was the exact number of dollars that he started business with in 1888. But I know that he had something better—nerve and stick-to-it-iveness.

DON'T GUESS.

The larger the city, the larger the job. This is true to some extent, but there are lots of small jobs everywhere, but, whether large or small, they should be carefully figured. One dealer told me of a contract that he secured for furnishing a large amount of building material. The price he received for it was $13,000. There was a small loss on the contract.

The next year the same contract came up again and this dealer put in a figure of $14,000. The job, however, went to a competitor for $12,000. After a time the two dealers met and the second dealer was asked why he had figured the job so low. His answer was that he knew the price it was let for the year before. He supposed if he got it he would need to take it below that figure, supposing there was a large margin of profit in it, and, as he needed the order, he made that price.

It looked to me as though the first man guessed at it, and the last man did not even guess. It is never a good plan to guess. The only way is to figure, and it does not pay to mourn over the fact that someone else has secured a job that you have figured on; not so long as you figured to make only a small profit, particularly if he guessed to lose.

Let your competitors take all the orders in which there is no profit. When they are filled up on those kinds of orders you will stand a better chance to make double the profit on one-half the labor.

In this connection might be stated the fact that it is poor policy to figure material that you bought at a bargain at the bargain price. How often has it been the case that a dealer has bought a snap, and congratulated himself on the fact, and then gave the whole snap away the next job he figured! This works badly in two ways. First you lose your profit, or rather, the profit that your snap should have brought you, and, worse than this, you make a dissatisfied customer.

This reminds me that many a good customer is spoiled with snaps. There is another way to spoil good customers, and that is in allowing a small customer to buy of you in carload lots. We will say the carload does not fill the bill, but it has been shipped in to him and sold on a very close margin. A little while after the car comes in and is unloaded the customer comes to you and says, "I will need 15,000 more lath for that job. Please send them up at once." You remind him that this lot will have to be sent out from the wharf and will cost the regular retail price. The customer will at once proceed to argue with you, either from ignorance or from a desire to secure something for nothing, and, whichever way the controversy ends, you have made an enemy. It is a question whether it is good policy for a dealer to both wholesale and retail from the same office, and it seems as though the small dealer should let the wholesale end of the business alone until the time comes when he can do a wholesale business from an office established for that purpose.

This is another place where it does not pay to guess. Better figure these things for yourself. The contractor, arguing from his standpoint, does not see any reason why, if you can sell him 150,000 lath at a certain price by car, that you cannot add to the order 20,000 more, even if you do have to take them out of your yard, and does not understand why you should not sell them at the same price. He either does not or will not take into consideration the fact that to the lath on your yard must be charged storage, handling, interest on the money invested, and insurance. He usually gets mad when he finds you will not accommodate him with the extra lath at the carload price, and the more you try to explain to him, the more unreasonable he becomes, and the chances are you lose a customer.

The next time he has a carload order he most likely buys somewhere else, but he does not try to buy any extra at the same price. You have taught him that that is not business. You have really done him a favor by teaching him this, but such favors, as a rule, are not appreciated.

If you will stick to the retail business and let that customer buy his carload lots somewhere else you can often make as much on the extras that he needs as if you sold the carload and keep your customer good-natured.

The Lancaster Company, 9 Clinton street, Newark, N. J., builders and contractors. Capital, $125,000. Incorporators are: B. J. Daly, F. Boeninger and Joseph B. Bloom, all of Newark, N. J.

Stewart & Company, Inc., 536 Main street, East Orange, N. J., builders and contrators. Capital, $100,000. Incorporators, Wm. A. Stewart, C. Stratch and Samuel E. Stewart, all of East Orange, N. J.

WHAT ARE YOUR PROFITS.

While in Boston talking with a dealer in rock products we dropped onto the subject of figuring the profits, and he gave me a little of his own experience in that line.

It seems that a number of years previous he was talking with an acquaintance who had had a lot more experience in business than he had had. When the dealer told the old man that he was in the habit of figuring 15 per cent profit on all sales, the old gentleman laughed and said he did not believe that the dealer knew what his cost was; in fact, he said he did not believe the majority of business men, particularly in their line, knew exactly what it cost them to do business.

This set the young man to thinking. In fact, he could not get it out of his mind. The result was that he sent for a first-class bookkeeper and told him exactly what he wanted. Say, did you ever see a fellow looking for something he was afraid he would find? That was the way the young man felt when the bookkeeper handed him the expense account for that first month's business. He was so ashamed of it, as well as being surprised, that he has never told what that expense amounted to.

It reminds one a whole lot of running a chicken ranch on paper. A man can figure himself rich and not use much paper, nor use anything but the stub of a pencil. In figuring the expense of raising chickens, one usually forgets the figuring of the effect of the cold rains before the chickens have shed their pajamas and got on their warm clothes. Then there are the rats, weasels and hawks, that are not usually considered, as well as a few other things not laid down in books with titles, "How to get rich quick with a few eggs and a match."

In the building material business it is much the same. A part of the overhead expense in the chicken business is liable to be a hawk, and a part of the overhead expense in the building material business may be a dead horse that cost $300.00 and that turned its toes up to the daisies without giving due notice.

Did you ever give the subject of overhead expense any real thought? If not, now is the time to commence. Just think a minute. First comes the interest on your investment. Now go slow and we will see what the word investment means. What is included in your investment? You commence with your yard or wharf, sheds, teams, tools, money in the bank and money you are loaning to your customers.

Never thought, did you, that you were loaning money to your customers? But you are. How much have you on your books today? I don't mean money overdue. I mean all the money that you have furnished stock for that you have not received pay for. If you will carefully go over your books you will find that you average to have on them a certain amount of money, and of course that is a part of your investment, because you cannot use it for anything else. You may say that you get as much time from the manufacturer or wholesaler as you give, but you cannot figure that way, for the proper way for a man to do business is to pay cash and secure his additional discount.

Then your investment is your yard, your stock, your teams, tools, money on hand, and money in the hands of your customers. So much for your investment. All of this may be called overhead expense, and you must add to it your salary and the salary of every person in your employ who does not do manual labor; then add your insurance, both fire and liability, your taxes, water, lights, and from 10 to 20 per cent for wear and tear on your teams and tools. Put this in a lump sum and hold it in your hands and figure how much business you must do to pay that expense before you can commence to count the profit.

Some people are so busy that they do not have time to read the trade papers in their own business. All they have time to read is the latest sensation in murders, what team leads in the baseball game, and who is to be our next president. The latter, in all probability, will have as little effect on business as the other two.

It is to the interest of every dealer to have his competitor know exactly what it costs to do business. It is of no benefit to one dealer to have his competitor lose money through ignorance. Therefore every reasonable effort should be made to interest dealers in knowing exactly what it costs them to do business.

I once knew a printer who said he could beat his competitors figuring on any job he wanted, because it did not cost him anything to feed his press. When asked how he explained that, he said his wife fed the press. There was some excuse for this man, but there is no excuse for the man who is lying to himself about what it costs him to do business.

MODEST DEALERS.

Do you know I have been meeting very modest men lately, all dealers in building material, at that, mostly mason's supplies. Here is a sample of my interview with one of them, which would do for quite a number of others.

"Good morning, Mr. Dealer; I am representing ROCK PRODUCTS, of Chicago, and called to pick up a few ideas in regard to the business of buying and selling building material."

"Yes, sir; I know your paper, but we are not advertisers; you could not interest us in the least. The people you want to see are——"

"One minute, please; the people I want to see are just such men as you. I am not an advertising man. I am on the editorial end of the paper, and you can help me to the information I want."

"Oh, you are doing writeup work. Well, we don't care for a writeup; we are only a small concern, and we don't believe in those things."

"Did it ever occur to you, my friend, that a trade paper does a lot of work in the editorial department that costs a lot of money to secure, and that we are obliged to secure the information from the people who know, and that you are one of those people?"

With suspicion written all over his face, he said, "Very well; what can I do for you?"

"You can give me a few moments of your time, show me over your plant, and tell me something about your methods of doing business that will be interesting to other dealers who are readers of ROCK PRODUCTS."

"My yard is the same as lots of others you must have seen, and I don't think of a thing I could say that would be of the least interest to anyone."

"That is a fine team you have there, Mr. Dealer; I am an admirer of a fine team."

"That team does not belong to me; in fact, I do not own any teams. I have my teaming done, and then I know exactly what it costs me."

Then he went into a dissertation on teaming that made me sit up and take notice.

"Teams," said he, "are one of the drawbacks to the builder's supply business. There are two ways to handle it. One is to hire all your teaming done, as I do, and the other is to do your own teaming but make your teaming a separate business, keep a set of books on that business alone, and see how you come out each month. If I was running my own teams I would divide the city in zones and have different charges for different distances."

"How would that work if you were bidding on a job on the other side of the city where someone else had the same system, his yard being located within that zone?"

"He would secure the business. Why should I want it if I had to lose the profit I made on the goods, or at least a good portion of it, in the teaming?"

"Then you believe if every dealer in building material would keep an exact account of what his teaming cost the result would be more profit for the dealer?"

"I not only believe it, but I know it. No man is going to throw money away if he knows it. The trouble is, the dealers, as a rule, don't figure the cost of teaming; they think that teams are something they must have, and the expense of teaming goes in with the general expense, with no effort to keep down the cost."

"That is good dope, Mr. Dealer. That is exactly the kind of information I am looking for."

"You don't mean to say you are going to print that in your paper?"

"I certainly am. You have told me that one of the evils in the business is the teaming end of it, and if I can put it before a few thousand other dealers it may be of great benefit to the trade. This little talk has not cost you a cent, but according to your own account it may be the means of making you dollars."

"There may be something in that, but don't mention me or my company. I don't want to set myself up as a wise oracle that can tell my competitors how they should do business."

No amount of talking would induce this dealer to change his mind on that score, and so I will be obliged to give this as the result of a good deal of thought from a very modest man.

There is a curious fact in regard to business of any kind. There are many bad features that creep in, and the only way to weed them out is by advertising the fact that they are bad features and give the remedy. The trouble is never in finding the remedy, but is always in waking the dealers up to the fact that the bad feature exists.

I met a dentist once who traced all the diseases of mankind to the neglect of the teeth, and this is often the case in the business world. One dealer

has an idea that all the troubles in business are due to one thing, while another dealer decides they are due to something else. In my opinion, there are as many leaks in the average business as there are holes in a colleuder, and the business man who stops the greatest number of leaks is the most successful.

CONSERVATIVE BOSTON.

Dr. Charles F. Dole, president of the Twentieth Century Club, in speaking at a banquet of the Young Men's Christian Association, said that the worst citizens of Massachusetts were of the old Puritan stock. "People of New England," said he, "think they are made of finer clay than any other people in the world. This was the barbarian idea of life. Animals think of themselves alone. We need a broad sympathy."

No doubt Dr. Dole is honest in his assertion, but the people who came from the old Puritan stock are not the only ones that partake of the barbarian idea. For years the forty-niners in San Francisco made themselves ridiculous by not considering anyone but themselves, and today the native sons are taking the places left vacant by them.

New York is the only city in America, according to several million people who live there, and the people of Seattle have nothing but a feeling of pity for anyone who is obliged to live anywhere else. Therefore it is more than possible that there are more than the people of Boston that need to have their ideas broadened.

There is so much intercourse between cities that it does not seem possible that so much difference should exist, but it does exist, and the peculiarities of the people of the different sections are real.

Seattle is building a 42-story building, while in Boston the height of buildings is restricted to 125 feet. Some say this is on account of the width of the streets, but it is more than possible that it is more from a desire to follow conservative lines. The people dislike to get out of the old ruts.

There is often some good, however, in sticking to the old ideas, especially in the matter of a company or firm name. Walking down Albany street one morning I noticed the old familiar sign, "Henry Crafts' Sons." When I was a boy in Boston this sign was familiar to me, and it seems to me now that every Bostonian must know that they deal in everything in the building material line outside of lumber, and many people know that they are the oldest firm in that line in Boston.

Henry Crafts must have been dead for many years, and one of the sons is also dead. The business is now carried on by the surviving son, Mr. J. Chandler Crafts. This business has been carried on at this same stand since 1873, the business coming here from Dorchester at that time. Mr. Crafts resides in Brookline, noted as Boston's most exclusive suburb.

I have gone a long way to say what my first thought was when I started to write this article. It was that one of the best advertisements a company can have is to hang onto the old name. There is only one reason why the name of a company should be changed, and that is that the new name has more influence than the old one, and that is not often the case.

I always think when a company changes the name that it has been doing business under for a long time that they do not realize the value of the advertising that the old name has gained for them.

Boston may be old-fashioned and slow, and the height of her buildings may remind one of Lincoln, Neb., but it shows the good sense of the business men when we can read the old signs that we saw here thirty years ago, and in many cases we know there is no one of that name now connected with the business.

Sometimes I have wondered if it was really for the benefit of the advertising that the Boston companies did not change the names, or is it because they are inclined to antiques? Whatever the reason is, the benefit is the same, and we should be charitable and not lay it to narrowness, for then, with Dr. Dole, we would be obliged to say they need broadening in this line as well.

The Home Supply Company, 412 Market street, Camden, N. J., builders and contractors. Capital, $10,000. Incorporators, F. R. Hansell, John A. Macpeak and C. U. Martin, all of 419 Market street, Camden, N. J.

Edgerley & Gilson, 5 Watsessing avenue, Bloomfield, N. J., to deal in lime, brick, coal, hardware, etc. Capital, $100,000. The incorporators are: A. H. Edgerley, Mary M. Edgerley, of 67 Watsessing avenue, and S. E. Gilson and Blanche M. Gilson, of 25 Clearfield avenue, all of Bloomfield, N. J.

YOUNG BUT STRONG.

The Starritt & Field Company, of Boston, has not been long in the field under the same name. Mr. E. S. Field was manager of this same business when it was owned by the Curtis & Pope Lumber Company. After Mr. Field had been with the old company for twenty-five years a new company was organized to take over the mason's supplies from the Curtis & Pope Lumber Company.

The new company is now three years old. Mr. William G. Starritt, whose name heads the list, was for a long time with the R. G. Morse Company. The last named company was for many years among the leading dealers in mason's supplies in Boston.

The two men who formed the new company had had a large amount of experience in this line and have made a success, although they are very modest when it comes to talking of their own achievements.

Mr. Field, who is manager of the company, is a man of progressive ideas, and he gave me many pointers about the business that showed he had made good use of his time for the last twenty-eight years in the business.

I have said that Mr. Field was the manager of the business, but he did not tell me so. Mr. Starritt referred me to him and I took that much for granted. They have a very nicely fitted up office; in fact, one of the best I have seen in this line of business. Mr. Field is a firm believer in system and is one of the few men I have met who believe that a perfect system can be carried out in a small business as well as in a large one.

This company has a fine wharf and first-class storage sheds which are located about five minutes' walk from their office. This is the first place I had noticed where the lime barrels were piled on end instead of being rolled in the old way, and Mr. Field was quite enthused over the idea. In the first place it economizes space to the extent of about one-third. It saves time in piling and also in delivering, and does not crush the barrels. Two rows of barrels are stood on end, and on top of these one and one-half inch common barrels are laid. Then the next tier is rolled on and stood up. Three tiers are put up this way, which makes the pile of lime barrels higher than they are usually piled when laid down in the old way.

The sheds of this company are located alongside of the slips where the vessels unload. The lime is hoisted onto a staging which is rigged high enough to make it an incline to the pile at all times. The lime is loaded onto wagons from the opposite side of the sheds, and from that side is always an incline to the wagon.

The main point, or at least one of them, when it comes to dealing in mason material, is in economic handling. Every machine that is invented today has for its object the reduction of the cost of labor, and the man who can plan his work so that one man can do the work of two is on a par with the inventors or labor-saving machines or with the man who can make two blades of grass grow where only one grew before.

NEW INCORPORATIONS.

(By the Corporation Trust Company, New York, N. Y.)

The following new companies have been incorporated in New York, New Jersey, Massachusetts and Delaware:

New York.

Geo. L. Lysat, Inc., building and construction work; capital, $5,000. Incorporators: Geo. L. Lysat, 67 Bloomfield Ave., Newark, N. J.; L. C. Alston, Port Richmond, S. I., N. Y., and Oscar Yenni, of White Plains, N. Y.

The O'Brien Construction Company, of Syracuse, N. Y., general contracting and building; capital, $10,000. The incorporators are: John A. O'Brien, Robert E. O'Brien and Daniel B. O'Brien, all of Syracuse, N. Y.

The Gibson Construction Company, of Manhattan, construction work and real estate. Capital stock, $50,000. The incorporators are: Geo. E. Gibson, 9 Cooley Pl., Mt. Vernon, N. Y.; Philip S. Seligman, 307 Decatur St., Brooklyn, N. Y., and Benj. H. Bern, of 246 Grand St., New York City.

The Venadrian Building Company, general contractors and builders. Capital, $5,000. The incorporators are: F. F. Hartich, 482 E. 18th St., Brooklyn, N. Y.; Frank B. Little, 411 Sterling Pl., Brooklyn, and George G. Kney, of 213 Prospect Pl., Brooklyn, N. Y.

The Kelly Contracting Company, general contractors. Capital, $100,000. The incorporators are: William Kelly, 233 Berkley Pl., Brooklyn, N. Y.; Archibald McFarlane, 165 Ninth Ave., Brooklyn, N. Y.

The Gilmer Fire Proofing Company, fire proofing and fireproof construction. Capital, $4,000. The incorporators are: George Martin, 446 Sixteenth St., Brooklyn; Chas. V. Gilmer, 511 West 113th St., New York City, and L. Gilmer, 210 West 72d St., New York City.

The Victoria Sand Company, dealers in sand, gravel and builders' supplies. Capital, $20,000. Incorporators are: Jos. F. Stabell, Geo. A. Stabell, and Ruben W. Eberly, all of Buffalo, N. Y.

The Valley Construction Company, contracting and construction business. Capital, $20,000. Incorporators are: Robt. W. Siver, Sidney, N. Y.; M. D. Winsor, Guilford, N. Y., and Chas. A. Winsor, of Guilford, N. Y.

The Flushing Construction Company, building and construction work. Capital, $10,000. The incorporators are: R. R. Brennan, 384 Broadway; M. A. Williams, 386 Broadway, and J. A. Holahan, 3 Wilson St., all of Flushing, L. I., N. Y.

The Peekskill Stone Company, Cortland, N. Y.; deal in stone, sand, gravel, etc. Capital, $100,000. The incorporators are: James Meyers, Poughkeepsie, N. Y.; Henry S. Reed and Clifford Couch, of Peekskill, N. Y.

The Great Eastern Construction Company, building and contracting business. Capital, $100,000. The incorporators are: Harry B. Mingle, Richard B. Tillinghast and Robert B. Hinck, all of 165 Broadway, New York City.

The Watertight Cement Binding Company, Inc., manufacture cement and metal binders. Capital, $50,000. The incorporators are: Sylvester A. Higgins, 289 Sherman avenue, Jersey City, N. J.; John R. Martin, 326 Canal street, New York City, and Harry Katz, 261 Broadway, New York City.

The Kerwin Construction Company, of Albany, N. Y., contractors and builders. Capital, $5,000. Incorporators are: Timothy E. Kerwin, 666 Madison avenue; Edward P. Kerwin, 166 First street; Hugh M. Collins, 16 Myrtle avenue, all of Albany, N. Y.

The Silica Brick & Tile Company, of Watertown, N. Y., manufacture brick, tile, etc. Capital, $75,000. Incorporators are: Wilbur H. Gardner and J. F. Larue, of Philadelphia, N. Y., and Oliver Watson, Watertown, N. Y.

New Jersey.

The F. R. Price Construction Company, 510 Union Bldg., Newark, N. J., builders and contractors. Capital, $50,000. Incorporators, F. R. Price, 46 Park place, Irvington, N. J.; H. Mott, 61 Greenwood avenue, East Orange, N. J.; W. H. Demarest, 510 Union Bldg., Newark, N. J.

Filliger-Craig Company, dealers in lumber and building material, supplies, etc. Capital, $100,000. Incorporators, L. Filliger, Joseph R. Craig and John P. Manning, all of 763 Broad street, Newark, N. J.

The Eden Company, 423 Bartlett Bldg., Atlantic City, N. J., builders and contractors. Capital, $100,000. Incorporators, S. Kahn, J. M. Kertland and M. Somers, all of Atlantic City, N. J.

The F. L. Dillon Construction Company, 31 Clinton street, Newark, N. J., builders and contractors. Capital, $50,000. Incorporators are: F. L. Dillon, Passaic, N. J.; R. R. Watson, Passaic, N. J., and J. E. Gibbons, Hackensack, N. J.

The Anchor Building Company, 243 Washington street, Jersey City, N. J., builders and contractors. Capital, $30,000. Incorporators are: L. T. Everett, 192 Clifton Place, Jersey City, N. J.; Edward Perpente, 67 Booraem avenue, Jersey City, N. J., and F. E. Ness, 12 Wyoming avenue, Elizabeth, N. J.

The Perth Amboy Supply Company, 510 Division street, Perth Amboy, N. J., to deal in brick, sand, cement and building materials. Capital, $100,000. The incorporators are: William C. Rock, R. B. Rock, H. E. Rock, all of Perth Amboy, N. J.

The Lucaston Brick Company, of Lucaston, Camden county, N. J., manufacture brick, tiling, etc. Capital, $15,000. Incorporators are: Lemuel Sichels, 2509 S. Broad street, Philadelphia, Pa.; Harris W. Watkins, 436 Kiaghns avenue, Camden, N. J.; Hyman Sichels, 2509 S. Broad street, Philadelphia, Pa.

Massachusetts.

The Ferguson Construction Company, construction business. Capital, $100,000. Incorporators are: Edward G. W. Ferguson, of Boston, Mass.; Charles W. Abrams, New York City, and Wm. C. Dooris, Peabody, Mass. Attorney F. W. Fosdick, Barristers Hall, Boston, Mass.

Delaware.

The Kentucky Portland Cement & Coal Co. Capital, $1,200,000. Incorporators are: Harry J. Mathews, Robert S. Maslin, Wm. L. Haworth and Emery M. Newton, all of Baltimore, Md.; John W. Dreisbach, Union Bridge, Md., and John L. G. Lee, of Belair, Md.

Lime

The National Lime Manufacturers' Association

Meets Semi-Annually.

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STRENGTH OF MORTARS.

Hydrated lime makes a stronger mortar and affords a stronger bond in brick work than a mortar made with lump lime slacked in the ordinary manner. This statement sounds remarkable, but it is true. The writer had occasion to make some tests in this connection and the above statement was borne out by the results. The tests proved that when the lump lime was slacked in the ordinary manner and then made into mortar with three parts sand a tensile strength of 25 pounds in eight days was developed, while with the same lime by hydrated dry in the machine, showed 31 pounds in eight days. These results were quite puzzling for some time as no plausible explanation could be offered for this difference of over twenty per cent in favor of the hydrated lime mortar. However, in the course of these tests it was observed that the stronger the mortar and the more rapidly its strength developed the less plastic the mortar was and the greater the tendency for it to work short. In fact experiments were made in hydrating that produced a hydrated lime capable of developing 45 pounds tensile strength in a 1—3 mortar but which was so short it could hardly be worked at all.

The writer went out and visited a number of jobs and had masons and plasterers test various samples practically and obtained their opinion as to the cause of this phenomenon. The invariable reply was that the hydrated was "burned" in slacking and that this was the cause of the stronger mortar and the lack of plasticity, but this didn't give me any information.

About eighteen months ago the writer discovered the formation of crystalline calcium hydrate and advanced reasons for the formation of the same which have since been verified by new hydrating machinery designed to overcome this objection and the results have been remarkable in this direction.

But from recent experiments of which the foregoing was the starting point, there is another factor which enters into the plasticity of hydrated lime.

In hydrating one particle of lime is supposed to unite with one particle of water and thereby form one particle of calcium hydrate, but in dry hydration this doesn't always happen. For instance, why could not 6 particles of lime unite with 6 particles of water forming 6 particles of calcium hydrate all interlocked together forming one mass, or twelve particles or any number react in this manner?

This the writer believes is a factor in the plasticity of hydrated limes for it is readily seen that the friction of spreading these conglomerate masses of calcium hydrate particles would be much greater than if each particle was separate and distinct. Also the fact that prolonged soaking of hydrated lime before using lessens the friction on the wall, shows that these conglomerated masses of hydrated particles gradually diffuse and resume their separate identies.

In slacking lump lime in the ordinary fashion of course this "bunching" together of particles is avoided for there is always an excess of water present in which the diffusion of the calcium hydrate particles readily takes place. The writer is carrying on some educational experiments along the verification of this view and as soon as further data is obtained it will be given in these columns.

SAN FRANCISCO LIME NEWS.

The Tehachapi Lime Company has been incorporated at Bakersfield, Cal., with a capital stock of $100,000, by George Gordon, F. A. Cummins, S. H. Ganett, J. F. Waller and Rex de Barr.

J. B. Sanford, of Ukiah; Cal., W. P. McFaull, of San Francisco, Cal., and others, who have been planning to put up a lime plant near Hollister, Cal., have finally secured the tract of land desired, containing a valuable lime rock deposit, and it is expected that they will commence work on the plant in the near future.

NEW YORK LIME NEWS.

New York, N. Y., June 13.—The demand for lime in the local market continued to be of fair proportions during the past month, but dealers, however, report that the call is below normal. Prices have been well maintained for the standard grades, but the inferior grades have been shaded on big business. A large number of building prospects have been let out during the past month and dealers claim that business will undoubtedly improve from now on.

Foster M. Comstock, president of the Comstock Lime & Cement Company, speaking in regard to the local lime situation, said, "A routine business continued in lime during the past month. Some dealers with whom I have spoken report that the demand for lime has improved in some districts, but on the whole business conditions are quiet. Prices have been fairly well maintained. The outlook, however, appears to have brightened up somewhat and the prospects are good for future business."

E. B. Morse, of the Frank B. Morse Company, stated, "We have done a good amount of business during the past month and the demand for lime was much better than during the previous month. The improved weather conditions undoubtedly was the cause of the increased sales. From present indications we expect a good movement to continue as the building season advances."

J. A. Curtin, of the Farnham Cheshire Lime Company, added, "The demand for lime continued good during the past month, and the price of the standard grades has been maintained, but it is reported that prices for the inferior brands have been shaded somewhat. During the month a large number of building operations have been started and these jobs will be ready to use lime in the fall months."

PITTSBURGH LIME NEWS.

Pittsburgh, Pa., June 12.—The Pittsburgh Lime & Stone Company has started a force of men working on the floats along the Potomac river on the West Virginia side. The company proposes to build a railroad across the river to connect with the Western Maryland, and this will put on a large force of men.

The Carbon Limestone Company has been made defendant in the sum of $15,000 in a suit filed by John Marshik, of Youngstown, Ohio, for injuries alleged to have been caused when a train jumped the track at its quarries at Hilltown, Pa., on November 13, 1911.

The National Mortar & Supply Company is running its Ohio plant to nearly full capacity. The trade in agricultural lime is held over until August or September. The general prospects are fair to good and considerable lime is being moved out to builders' supply dealers this summer.

Reeves Hill and J. F. Wagner have charge of the operation of the Pittsburgh Limestone Company in Berkley county, W. Va. The company expects soon to be operating on a large scale, especially as the Western Maryland link will shortly be finished in that county. It is at present getting out fluxing stone for the United States Steel Corporation.

The Monongahela Stone & Brick Company has arranged to market the deposits of the Bluestone Fire Clay & Sand Company in Cool Spring Valley, near Uniontown, Pa. R. D. Jones is general superintendent of the company, which will employ 200 men.

The Consolidated Stone & Mining Company with offices in the Farmers Bank Building, complains severely of the apathy in letting contracts. A good deal of city and borough curbing has been let but nearly all of this was concrete. In paving the majority of the work has been brick. Bridge jobs are about the only ones that have required any considerable amount of stone for spring and early summer delivery. The company's Ohio quarries were fairly busy and until this week it has had its full share of the prosperity throughout this section.

THE USE OF LIME CONCRETE.

Someone has said that the average American is a slave to fashion. While this, of course, is not true, there is a tendency in some quarters to overlook some mighty good things that other countries use with great success. A case in point is concrete. One hardly ever, nowadays, sees anything going into a batch of concrete, no matter for what use it is to be put, but Portland cement, broken stone or gravel, or both, and sand. We seem to have overlooked entirely the fact, that for some purposes, broken brick is an excellent substitute for broken stone or gravel, and good, well-burned lime for cement.

The writer was recently connected with the construction of foundations for a large monumental building, which was erected on a site previously occupied by a large power house. In taking out the old foundations, the drawings and specifications for which had been destroyed by the fire that burned the power house, it was found that most of the footings and bearing walls up to the superstructure were of brick concrete. It proved to be a beautiful piece of work, and it seemed a pity to destroy it. This had to be done, however, but the task was by no means an easy one, the mass having become as hard as granite.

Lime concrete, or lime beton as the French call it, has been in longer and more general use than cement concretes. It was a first-class material when made with ordinary quicklime, and since hydraulic lime has been used it is better. It is a much cheaper composition than cement concrete; easier to work, and, if the initial load be not too great, it is for many uses just as good. A good lime beton can be obtained by mixing mortar, stones and gravel, or cinders, mortar and good-sized stones, which makes the best composition. Such a composition is very popular in France. Probably one-half of the houses in Marseilles have been built of this material, and thousands of the older buildings, many hundreds of years old, are held together with ordinary lime. Walls built of quicklime beton must be laid very slowly, but with hydraulic lime beton can be erected as fast as the masons can work. The solidity of lime beton construction is shown by the seawalls and docks in Marseilles, where masonry of this kind can be seen both below and above sea water, the most difficult test to which a building material can be subjected.

The lime is weighed out to the cubic unit of sand, and the two dry-mixed until thoroughly incorporated. Water is added slowly with a sprinkler, and the plastic consistency tested by forming a ball with the hands, which should exude a slight moisture, and being laid aside should neither flatten nor crack open. Stones or other cheap material are mixed with the mortar, thus constituting the beton. Cinders, coke and furnace slag are often substituted for stones in ordinary house and wall work. If broken stone is used, it is broken to from ¾ inch to 2½ inches across. The proportions are usually two parts of stone to one part mortar for work under water; in air and above ground the proportion of stone may be increased.

The form, of course, is the same as for cement concrete, and the beton is usually placed in eight to twelve-inch layers and rammed. The surface is scratched and treated with a wash of thin mortar or grout before putting on the next layer.

In both France and Germany a light-weight beton is made of cinders. Buildings several stories high of this material are common, but when they exceed one story in height they are reinforcedd with the usual steel rods. Several very large factory buildings have been built at Lyons of this beton.

Striking economies are effected in France by the free use of cheap local material, whatever it might be, and by the equally free use of lime where cement would probably be used in the United States. —J. W. Moultrie, in the "Scientific American."

INTERNATIONAL ROAD CONGRESS.

W. Rees Jeffreys, secretary of the British Road Board, is in this country in the interests of the third International Road Congress, which will be held at London, England, June, 1913. For the past nine years Mr. Jeffreys has been active in road work in England, having held the office of administrative secretary of the Royal Automobile Club and secretary to the Motor Union since 1903. While in New York, Mr. Jeffreys was tendered a banquet by the American Road Builders' Association at the Hotel Astor, at which seventy-five men prominent in road building were present. Mr. Jeffreys will visit Boston, Philadelphia, Baltimore, Washington, Chicago and Detroit, after which he will go to Toronto, Canada, thence to Niagara, Ottawa, Montreal and Quebec. He is the author of much literature on highway administration and maintenance.

The Concrete Steel Building Co. has opened offices in the Kennan Bldg., Pittsburgh, Pa., in charge of K. H. Bowman. The company will make a specialty of cement floors, walks and other material.

A MODERN LINE OF HYDRATING

Elevating Conveying and Power-Transmission Equipment.

A cursory study of the business of the Weller Mfg. Co. brings to view many interesting sidelights on the methods devised by this company to reduce handling and power-transmission costs to the minimum by effecting an economy in time and labor. The experience and reputation of this company are too well known to require comment here, and it seems hardly necessary to remark that any product of the concern can be relied upon absolutely as regards its design and general construction.

The rapid increase in the manufacture and use of hydrated lime is causing many manufacturers to

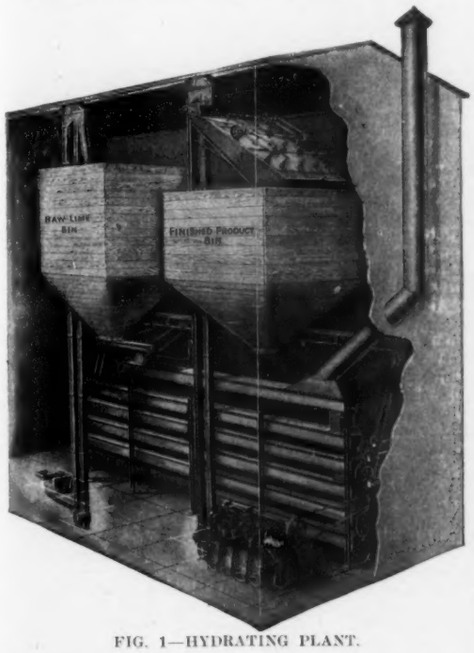

FIG. 1—HYDRATING PLANT.

install their own hydrating system. In view of this we are induced to call the attention of our readers to the lime hydrating system recently placed on the market by the Weller Mfg. Co., which promises to revolutionize the business to a very marked degree.

One of the strongest features connected with it is its adaptability, allowing the speed to be easily adjusted for different grades of lime; the advantages of this can be easily recognized.

The simplicity of operation is another great point. The Weller Lime Hydrator is stated to embody every idea known for facilitating the operation which, combined with the thoroughness of construction, insures the maximum results at the minimum maintenance costs. Notwithstanding its many good qualities the cost of installation is remarkably low, and any manufacturer considering putting in a hydrating system would do well to take up the matter with the Weller Mfg. Co. The Weller Hydrator is shown as Fig. 1.

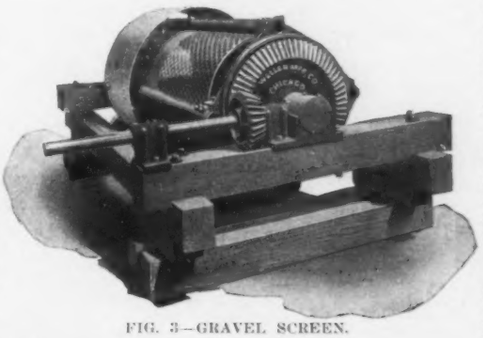

FIG. 3—GRAVEL SCREEN.

FIG. 4.

The business of the Weller Co. embraces the manufacture of practically every kind of equipment needed in stone quarries, etc., for handling materials and transmitting power. Illustration No. 2 shows a typical Weller Elevator installation, used for handling stone and ores. These elevators are furnished complete with geared countershaft head drive, and are made in all sizes.

This company makes a very complete line of screens for use with all kinds of rock products. Figures 3 and 4 show the Weller Trunnion Supported Rotary Screen and the Weller Conical Overhung Rotary Screen, respectively. The latter is particularly adapted to gravel washing and kindred uses, and is a greatly improved type of construction.

Various styles of steel cars are described in the company's catalog, prominent among them being their Tilting Hopper Car, Bottom Dump Car, Side Door Dump Car and an Automatic End-Dump Car. A Scale Hopper Car is also shown. Figure 5 illustrates their Tilting Hopper Car. They offer their large, complete catalog (No. 20) free on request.

THE BOSWORTH CONSTRUCTION CO.

We are in receipt of a neatly printed folder of the Bosworth Construction Company, of San Francisco, Cal. This concern has been doing considerable concrete work in California, employing a monolithic system patented by P. H. Bosworth. The folder contains photographic reproductions of some all-concrete residences built after the mission style, which would do credit to any section of the country. After the forms are removed the buildings are stuccoed, giving them a handsome, ornamental appearance.

"It is unfortunate that there is not more reliable data on the depreciation of manufacturing buildings. There is little information as to the preventing of dry rot, almost none on the effects of humidifiers on the life of timber, little of the loss of value through the design of buildings becoming obsolete—this last a serious one against the more expensive and hard to remove concrete—neither is there much data on the value of light in manufacturing processes."—From paper by Mr. Morton C. Tuttle, of the Aberthaw Construction Co.

The J. A. Haller Construction Company, of Akron, Ohio, has been incorporated with a capital stock of $10,000 to do general construction. The incorporators are J. A. Haller, M. M. Haller, Charles Cranz, Nick Huber and B. F. Hamlin.

Thomas Magiff of the Knickerbocker Portland Cement Company, New York City, in speaking of business, said: "Our trade has been excellent; our difficulty has been to get cement enough to go around. Prices are as low as any time this year. Contracts have been made at low prices. It looks like a lean year for the cement manufacturers."

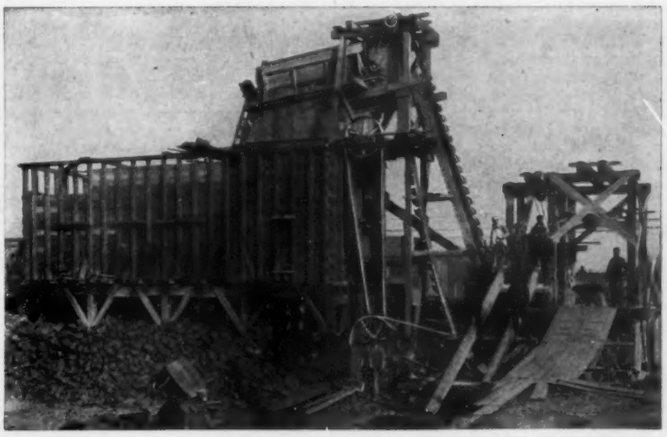

FIG. 2—ELEVATOR EQUIPMENT.

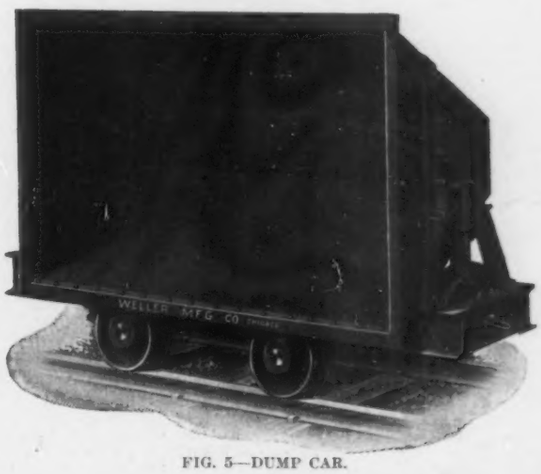

FIG. 5—DUMP CAR.

SAND AND GRAVEL

NATIONAL ASSOCIATION OF SAND AND GRAVEL PRODUCERS.

Meets Annually.

OFFICERS.

F. W. Renwick, Chicago Gravel Co., 343 S. Dearborn St., Chicago, Ill.....President
H. H. Halliday, Halliday Sand Co., Cairo, Ill. .....Fist Vice-President
W. F. Bradley, Ohio & Michigan Sand & Gravel Co., Toledo, Ohio.....Second Vice-President
H. F. Curtis, Lyman Sand Co., Omaha, Neb. .....Third Vice-President
Lee R. Witty, Wabash Sand & Gravel Co., Terre Haute, Ind.....Fourth Vice-President
J. J. Neary, Utica Fire Sand Co., Utica, Ill. .....Fifth Vice-President
C. H. Brand, Atwood-Davis Sand Co., Chicago, Ill.....Treasurer
B. F. Lippold, Chicago, Ill.....Secretary

C. H. Stebbins, N. C. Fisher, A. Y. Reed, ... Directors for two years

P. A. Stewart, T. E. McGrath, G. W. Bunker, ...Directors for one year

THE STANDING COMMITTEES.

C. H. Stebbins, W. F. Bradley, P. M. Lewis, Joseph Hoch, H. C. Cary, C. B. Shefler, ...Uniform Classification

P. M. Lewis, E. S. Davis, W. F. Bradley, R. Snoddy, ...Transportation

R. Snoddy, W. C. Jones, H. C. Cary, ...Co-operation

Official Organ.....Rock Products

CHICAGO SAND AND GRAVEL NEWS.

Chicago, June 21.—Business starting up later than usual this year in the sand and gravel industry in Chicago on account of bad weather conditions in early spring. The volume of trade for the months of May and June has been larger than the corresponding period last year. The demand for sand is rapidly increasing owing to the fact that building operations in Chicago have assumed really gigantic proportions and furthermore railroads who up to within a month were not in the market are now commencing to place orders to prosecute work which was needed to be done for some time past. Prices are low, but show a tendency to stiffen and it is confidently believed before the commencement of the fall season business will take a decided upward turn. Men in the sand trade feel there is nothing to worry about and that present unsatisfactory conditions will soon vanish.

C. H. Brand, president of the Atwood-Davis Sand Company, stated that the demand for sand and gravel is fair, but started up later than usual this year, probably on account of bad weather conditions early this spring. Railroads have not used any sand so far in their work, but anticipate to do so before long. The small towns within a radius of one hundred miles of Chicago doing more work in proportion than Chicago. "Prices for sand and gravel are the lowest they have been for some time," continued Mr. Brand, "but will advance undoubtedly when the fall season opens."

F. M. Richardson, president of the Richardson Sand Company, said: "Business is not what it ought to be. At this time of the year we usually have orders on our books for 200 to 300 carloads of sand. We have not got that today. Prices are low, but indications point to improved conditions when we get business into full swing this fall, which always is our busy time of the year."

C. H. Stebbins of the Lake Shore Sand Company reported the demand for sand and gravel good, but prices low and unsatisfactory. He said that last May they had the largest business they had done in years and were making heavy shipments this month. "Prices the last two weeks are stiffening," he continued, "and as the season advances every thing will come out right. There is lots of work in sight which will require the use of much sand and I believe there is nothing to worry about the conditions in the sand and gravel trade this season."

P. M. Lewis, secretary of the American Sand & Gravel Company, took a philosophic view of the conditions in the trade. "There is nothing to complain about the volume of business the last two months," he said. "This has been as large if not larger than last year, but without doubt there has been less money in it on account of low prices. Prices, however, will improve as we approach the fall season. It is not exaggerating to state Chicago is doing more building this season than it ever has and consequently the demand for sand will be very heavy. Railroads are commencing to plan orders and everything looks better. By the end of the year it will be found that the season has by no means been a bad one."

Frank W. Renwick, general manager of the Chicago Gravel Company, said that the volume of business was larger than at this time last year. "We have had a very busy month," he said, "and being sand producers have made large and heavy shipments to towns south, east and west of Chicago in Illinois. We have a number of large contracts for sand and gravel from four railroad companies. The demand has been good and indications all point to an active season. Prices are stiffening and show an upward tendency. With all the doubts that have been expressed this will prove after all a fair season for the sand and gravel men."

LOUISVILLE SAND NEWS.

Louisville, Ky., June 18.—A period of fine weather has put the sand men of Louisville and Kentucky just where they want to be. It was just about at this time last month that the sun appeared with a resolve to stay a while written all over his burning countenance, and it was just about this time a month ago, consequently, that the men behind the riggers began to feel that life was worth living, so far as business was concerned.

The big building jobs of the year are the ones which are commanding attention from the sand men these days, although there is plenty of residence work and small jobs scattered about from one end of the city to the other. The new $1,000,000 City Hospital at Floyd and Chestnut Streets is demanding hundreds of yards of sand daily. In a short time the Republic, Louisville's newest office building, backed by Chicago capital in the Continental Realty Company of this city, will be begun. Some time during the summer the 25-story structure of the Southern National Fire Insurance Company, which is to be modeled after the famous Woolworth Building in New York City, the tallest structure in the world, will be commenced at Fourth Avenue and Market Street. Incidentally, it may be noted that the Southern National Fire headquarters will be the biggest building in the entire South when it is completed. Then there is the Starks Building, located at Fourth Avenue and Walnut Street, on the most valuable unimproved site in the retail business district, to be erected by John P. Starks, associated with Chicago capitalists.

The Ohio River Sand Company is working its plant full time and finds that the city hospital job, one of the "plums" of the 1912 building year, is all that was anticipated. Deliveries from the Ohio River headquarters to the hospital are being rushed every day, and in addition to this major item the company has numerous contracts of minor importance. The Ohio River Sand Company has not yet completed any further arrangements for the establishment of its South Louisville shipping station, plans for which were reported to be in embryo some time ago. The company is said to be negotiating for a valuable outlet in the southern part of the city, where direct switching connections with outbound freight lines may be established.

Equipped with a new steam derrick which has a capacity of lifting 1,000 yards of sand per day from the depths of the Ohio river, the Nugent Sand Company is in shape to handle the biggest business of its career and, incidentally, is finding that its facilities are taxed to the utmost. The building boom is standing the Nugent and interests in good stead for, in addition to the Weissinger-Gaulbert apartment annex which is nearing completion, the company has a couple of other big jobs in prospect for closing in the immediate future.

The development of a big deposit of soft sand stone and the adjacent sand pits is being planned by the Eastern Kentucky Land Company. The deposit is located in Cumberland Gap, Tenn., but the company which proposes to work it has its headquarters in Mt. Sterling, Ky., under the direction of Lewis Apperson, secretary of the concern. A plant of considerable capacity, for quarrying the stone and producing the sand, is now being equipped in the Gap, and the company expects to be active in business within thirty days.

NEW YORK SAND AND GRAVEL NEWS.

New York, N. Y., June 13.—A marked improvement was noted in the demand for sand and gravel during the past month. This was due to the fact that we have been enjoying a period of ideal weather which has permitted the resumption of all kinds of outdoor construction work. Dealers report that the demand for gravel has been unusually active and they find it difficult to deliver their orders at times. The subways have consumed very little sand and gravel up to the present time as the contractors have not reached the stage where they are able to use these products. Prices have remained steady and dealers claim that with the amount of business on hand they will be kept busy throughout the summer months and from present indications look forward to a good business in the fall months.

Joseph N. Ely, of the Crescent Sand & Gravel Company, reviewing the local sand and gravel market during the past month, said, "The demand for sand and gravel during the past month showed a marked improvement over the previous month. The spell of fair weather has resulted in a renewal of work on all outdoor jobs and new operations have been opened. The demand for gravel has been especially active and we have been unable to fill our orders as rapidly as we wished to. The subways as yet are not ready to use our production in large quantities, but we have delivered a fair amount of sand and gravel for preliminary work to date. Prices are being well maintained. We will be kept busy making deliveries from now on until the winter months."

Charles A. Fox, of the Phoenix Sand & Gravel Company, added: "We have been doing a fair amount of business of late, but the demand for sand and gravel so far this spring has been below normal. The inquiry for sand and gravel, however, has improved somewhat and we are doing a better business than during the month of May. A lot of work has been started in Manhattan during the past two weeks and later on they will be in a position to use our materials. We look for good business to materialize in the fall months. As yet the subways have consumed very little sand and gravel as the contractors are still excavating."

A representative of the Goodwin Sand & Gravel Company reported that the demand for sand and gravel was fairly good during the past month, and they are of the opinion that business will increase as the season progresses. The brick layers' strike has somewhat affected the call for sand during the past week, but it is expected that the matter will be adjusted to the satisfaction of all parties concerned without any further delay. Prices are unchanged and we are quoting sand 45 cents alongside, Manhattan, and gravel 85 cents, same terms."

PITTSBURG SAND NEWS.

Sand business is first class hereabouts. River boats are all busy. Several new crafts have been added to the fleets this week, notably those built for the Rodgers Sand Company. These are steel barges and are being floated out from the Jones & Laughlin Company's boat yard at the foot of South 34th street. They are of the steel hopper type, 135 feet long, 26 feet wide and 8 feet 7 inches deep and carry 660 tons of sand each. Up the Allegheny river digging is going ahead rapidly. Although the demand for building sand in Pittsburgh is not quite so heavy as some years there is a big call for sand for Government operations and concrete work. The total of sales and delivery so far this year is away ahead of that of 1911.

The Tri-State Sand & Gravel Company at Rochester, Pa., has been organized with a capital of $15,000. The incorporators are George H. Jones, David N. Carver and T. L. Waggoner. The company is building a plant near Rochester, Pa., on the site formerly occupied by the Beaver Valley Coal, Sand & Supply Company, some thirty miles below Pittsburgh.

The Greenville Silica Sand & Quarry Company, of Greenville, Pa., has ordered considerable new machinery and is making extensive improvements to its plant.

At Dundee, O., the plant of the National Malleable Castings Company is reported to have been leased by a new firm. It has stood idle for six months on account of the high freight rate to Sharon. Under the new management it will probably start up and run all summer.

The Keck Sand Company, of Morgantown, W. Va., has been dissolved, L. V. Keck withdrawing from the firm. The business will be conducted in the future by C. I. Keck.

Arrick Brothers is the name of a new sand and

gravel firm at Welcome, W. Va., following the Wells Pitt Sand Company. The incorporators are O. R., D. H., P. M. and R. W. Arrick. They are putting up a new plant which will be equipped with the latest machinery and will have a capacity of 10 carloads of wash sand and gravel every day.

The Dick Sand Company, of Franklin, Pa., has arranged with the L. S. & M. S. Railroad for a switch at its plant two miles west of Polk, Pa. The company will dismantle its plant at Cochranton, Pa., which was partly burned several months ago and move the business here to the site of the new operation. This plant will have a capacity of ten carloads a day and will employ about 40 men.

Foxburg Sand Company has been formed at Pittsburgh by L. C. Cook, W. S. Flower and Chas. Neidhart, Jr. It will have an extensive operation.

The Iron City Sand Company is busy and has all its boats digging on the Allegheny river. Its outlook for business is better than last year and sales so far this year have been very satisfactory.

The Winfield Sand Company is running its plant at Winfield, Butler county, Pa., on full time. It is getting out a large amount of building and glass sand and reports general inquiry much better.

NEW CORPORATIONS IN ILLINOIS.

McLennan Construction Company, $10,000; general contracting and building business. Incorporators, Fred E. Thompson, A. C. Jones and K. L. Shanley.

Arthur L. Stevens Company; $25,000; general engineering and construction business. Incorporators, Joseph N. Gerrity, Lucius J. N. Malmin and Arthur L. Stevens.

C. Palmquist & Sons; capital stock, $2,500; general construction and contracting business. Incorporators, William Reeds, Helen Klitzke and Ernest G. Kusswurm.

Panama Commercial & Importing Company; capital stock, $30,000; dealing in stone brick, cement, marble and other mineral products. Incorporators, Joseph Bellis, John Flood and William F. Bossi.

Merrill & Munson Construction Company; capital stock, $2,500; building and maintaining community mausoleums. Incorporators, Z. T. Merrill, L. R. Verhoeven and K. E. Fallon.

Illinois Composition Flooring Company; capital stock, $2,500; general contracting and construction business. Incorporators, Samuel L. Cooper, William H. Yagle and G. Hawkins.

Fitz G. H. Kreamer Construction Company changed name to Kreamer Construction Company and increased capital stock from $5,000 to $8,000.

A NEW CALENDAR.

We have from the West Virginia Pulp & Paper Company a copy of their calendar which they are sending out to the trade. It is a neat little creation and copies may be secured by addressing the company.

We have at hand a very creditable booklet issued by the Lehigh Portland Cement Company on Concrete Silos, showing many forms of construction of silos, which constitute a very important problem in modern farming. The subject has been treated thoroughly and the book contains information that every retailer ought to have to hand out to the farmers who are considering the construction of such a silo. The Lehigh Portland Cement Company will be glad to furnish copies of this book to those interested.

We have received a copy of bulletin No. 114, issued by the Taylor Iron & Steel Company, High Bridge, N. J., describing application of TISCO Manganese Steel to Crushed and Pulverizer Parts. This bulletin should be in the hands of every one interested, as it contains information of the highest value.

SAN FRANCISCO SAND AND GRAVEL NEWS.

The Niles, Cal., Sand, Gravel & Rock Company is putting in a large outfit of Lidgerwood hoisting machinery, etc., all to be operated by electricity.

The Grant Gravel Company, operating in Livermore valley, east of San Francisco Bay, is putting in a lot of new machinery.

ILLINOIS SAND AND GRAVEL NEWS.

Springfield, Ill., June 21.—Dooley Brothers, of East Peoria, have engaged in the sand and gravel business.

C. L. Fancher, of Lincoln, Ill., has gone to Sabula, Iowa, where he will be associated with V. O. Johnston, formerly of Lincoln, in the sand and gravel business.

QUARRIES

SAN FRANCISCO QUARRY NEWS.

The state engineering department has ordered the construction of nearly 40 miles of the long-projected state highway, bids to be received June 25. The work will be in four sections, a short strip of asphalt on concrete base between South San Francisco and Burlingame, 10 miles of oil macadam from Madera to Califa, 9 miles of oil macadam near Marysville and 13 miles of ordinary grade near Hopland.

Early in May an unusually heavy blast was fired at Piedra, near Reedley, Cal., where the Santa Fe Railroad is getting out rock for ballast. The blast required 125,000 pounds of Judson powder discharged in seven tunnels. The blast dislodged about 600,000 cubic yards of rock. The work was done by the Fellows Construction Company.

The new budget of the Southern Pacific Railroad provides for the purchase of 400,000 tons of rock ballast for its Coast division.

The E. B. & A. L. Stone Company, of this city, is putting in a large tube mill outfit at its lime rock quarry on the ocean shore south of San Francisco, for the purpose of grinding limestone for asphalt finish. There is a large market for this material, and the supply has hitherto been limited.

The Healy-Tibbitts Construction Company, one of the leading local crushed rock and concrete construction firms, is making important improvements in its quarry at Richmond, Cal., having placed orders for a No. 5 and a No. 3 McCully crusher.

ILLINOIS QUARRIES.

George C. Guy, 37 years superintendent of the U. S. Wind Engine & Pump Company, at Batavia, Ill., has resigned to accept a position as superintendent of the Col. George C. Fabyan properties, which include a stone quarry and rock crusher near Batavia.

The state of Illinois has not enough prisoners at the penitentiaries at Joliet and Chester to increase the output of the stone-crushing and limestone fertilizer plants to meet the demand. There is a minimum of convicts now at work making articles of wear needed in the other state charitable institutions. If the limestone output is enlarged the macadam record must suffer. It is probable that things will be left as they are and the field left open to private plants.

Some time ago the soil department of the University of Illinois estimated 3,000,000 acres of land in the state needed the limestone treatment—about three tons to the acre. The state plant established at the Chester prison had a steady demand and later built storage bins so that it could run at full capacity, but in 1911 was unable to fill the orders. Its record of 33,000 tons could have been doubled had there been a supply. A minimum price of 60 cents a ton in carload lots or $1 a ton, sacked, was secured.

The two crushing plants at the penitentiaries last year produced 152,340 cubic yards or 381 carloads. Since the prison crushers were established seven years ago 17,596 carloads of rock have been produced and given away. The Board of Prison Industries can see no way at present to meet the demand for crushed rock caused by the hard road work of the Illinois State Highway Commission.

PITTSBURG STONE NEWS.

Stone men complain of one thing in particular, namely, the slowness with which state and county work is let this summer. State Engineer E. M. Bigelow is first of all a crafty politician of the old Mat Quay school. It has been charged against him publicly and in print that he is using his office to build up an army of old time Republican machine men in Pennsylvania and is putting in engineers and supervisors right and left who have absolutely no fitness for their positions and who are appointed merely because they are bosses in the same machine. At any rate the letting of state roads is going forward slowly and stone men who had expected a large amount of business from this source are accordingly disappointed. Bridge stone is in pretty fair demand throughout this section. The demand for curbing stone, however, is falling off steadily. This is attributed to the fact that concrete is being substituted very largely for stone curbing and there is talk of a definite movement among stone men to try to offset this substitution that is playing havoc with their own business.

The Independent Stone Company has bought the Wright farm at South Amherst, Ohio, and will open a quarry at once. Robert Patterson is in charge of the work and the stone will be shipped out over the Wabash.

G. S. White, of Pittsburgh, formerly with the Pope Stone & Brick Company, is now a general salesman for the Monongahela Stone & Brick Company, which has enough orders to keep it running at full capacity several months. R. D. Jones, formerly superintendent of the Pope Stone & Brick Company will be general superintendent of the same plant. This plant will employ not fewer than 200 men regularly when it is fully equipped.

The Kingwood Quarries Company, at Kingwood, W. Va., is getting out stone for the Cathedral of St. John, the Divine, being erected in New York City. The cathedral will cost over $3,000,000. The Kingwood Company is installing four new stalls and an air compressor in order to fill its orders for rough stone. Some slabs recently quarried were 10x4x2 feet.

The Clydesdale Stone Company is doing a very good business in bridge stone from its plant in Beaver county, Pa. The Craig Stone Company, which is owned by the same people and has a plant at Shearersville, Ohio, notes some apathy in the curb stone trade. This, it believes, is due to the large substitution of concrete for stone curbing.

SHIPMENTS OF STONE.

Austin, Tex., June —.—The state railroad commission has issued an order amending Commodity Tariff No. 9-B applying to shipments of stone, sand and gravel. It follows.

"Sand and gravel, carloads, minimum weight twenty tons per car, from points on International & Great Northern tracks in Austin to West Austin, 25 cents per ton. On shipments loaded on tracks of other lines switching charges to be added.

"Change Special Authority No. 3, Section 4 of Tariff, so as to hereafter read as follows:

"Shipments of stone from stations west of Austin to Llano, Marble Falls and Burnet, inclusive, on the Austin and Lampasas branches of the Houston & Texas Central Railroad, which are, under ordinary conditions, routed through Austin, may be stopped in transit at Austin for the purpose of sawing and shaping, at a charge of $5 per car in addition to the rate of freight from point of origin to the destination. Time limit at Austin to be thirty days."

The Simpson, Jr., Outfit, which was introduced at the last National Cement Show, has proved to be a wonder in the popularity with which the younger generation are taking to concrete products. The Simpson Cement Mold Co., of Columbus, Ohio, has introduced the first concrete make in toys in the world and are having a great sale for it.

We are very glad we were able to supply all our friends with all the convention tickets that were requested. We understand some few were disappointed. We had requests from 82, most of whom wanted ten or twelve each. When we took the list to Chairman McKinley, he said the best way was to get a block of five hundred or one thousand, or possibly two thousand; then we could send them in chunks, to all who wanted them. Most of the people who wanted tickets wanted to bring their families and a number of friends, and, of course, this was just as easy to comply with as any of the others. If there is anything easy to get in the world, it is a ticket to a National Republican Convention. There are ten thousand seats in the Coliseum, and this afforded ample room for everybody except eighty million who were too slow about the tickets.

BOUNELL IRIS AGGREGATE.

John Harper Bounell, 501 Fifth avenue, New York, is receiving many inquiries concerning his new facing material, Bounell Iris Aggregate. As has been mentioned in these pages before, Iris Porphyry is a beautiful blending of green and pink shades in natural colors of crushed porphyry, and presents the most pleasing effects.

The Diamond Block Machine Company, a concern which will manufacture all kinds of concrete block machinery, has been incorporated and is starting in business in Bristol, Tenn.-Va. The new company is incorporated with a capitalization of $20,000, the following being named as officers: Luke T. Howe, president; George M. Warren, secretary; Dick Burson, treasurer.

HARD PLASTER ORNAMENTATION.

In some respects it is astonishing to what limitations the manufacture of plaster has thus far progressed. This may sound a little out of tune at first thought, but it is true, and one reason is due to the fact that it has its limitations; or at least if it has not, few of us have discovered the means for very materially improving its manufacture in the past hundred years.

It is not to be inferred that there is any attempt to decry the progress that has been made in this commodity, because with our advanced ideas we have really progressed more than we might at first believe possible. But there are some things to be learned yet, and some improvements to be made that will be a step farther in the right direction and which will at the same time benefit us and our methods of construction work as well.

Our wood fibre and hard wall plasters are in some respects so much superior to the old time plasters that were popular half a century ago that we have cause to be thankful for the ingenuity of the plaster manufacturers. And yet this is only the beginning, as it were, and steps are being made toward what we might term a permanent staff or stucco, which is after all, simply a plaster. This is far from being impossible, though those who have sufficient faith in it to make the experiments are at this time comparatively few, because they have not looked far enough ahead. They have simply taken the endeavors in this direction as the best that can be accomplished, and have seen the failures where buildings were constructed with this material.

The time is not far distant when this idea will be a realization, and when we can construct houses with this material as easily and as rapidly as we now use other commodities. We may even add that there are experiments being made at this time that have thus far proven satisfactory. This is simply cited to show that there is progress being made in improving the nature and kinds of plaster for general use.

But there is still another idea that has not as yet been given sufficient tests to prove its adaptability and feasibility, and at the same time command the attention of plaster manufacturers and handlers. This might be fitly termed dry mortar; in other words a preparation composed of hydrated lime, sand, hair, or wood fibre, and such other ingredients as might improve its quality, and thereby increase its usefulness and popularity. It is essential to use hydrated lime because this lime will not slack, while the lump lime will, and consequently could never be used for such a preparation.

There should be a certain amount of care exercised in the preparation of this commodity, because while it may only be used as a first coating or for a cheaper class of work, nevertheless poorly made mortar is one of the most undesirable things in the world, and will cause any amount of trouble to those who either handle or use it. This prepared mortar could be packed in bags just as conveniently as hard plaster is done, and handled by the dealer to a very decided advantage. This appears like a suggestion that should lead some progressive manufacturer to thinking, and the manufacture of such a commodity would of necessity find favor with a large number of contractors and supply men.

There can be no question about the increasing use of hard wall plasters, because they have filled a want that has been felt throughout the entire building world for a long period. They are easily prepared, easily handled and give a satisfaction that will continue to make them a very desirable commodity. They comprise toughness, durability, lightness; are non-conductors of heat, cold, dampness, and have the fire-resisting qualifications that make them desirable as a covering for walls of all kinds.

The man who manufactures wall plasters has an ever increasing field of operations before him, but he must endeavor to widen his line, and improve his output if he expects to progress as rapidly as he hopes to do. He has opportunities that have not as yet been reached, and the increasing use of his materials will make this greater than ever before as time goes on. The handler of plasters has also some things to consider, because there are differences in the quality of hard plasters that are quite radical, and he must seek to handle only the best, as herein lies his success. A poor plaster is an abomination, and a good plaster is quite the reverse, so that the results are bound to be in accordance with these considerations.

HOT WEATHER HINTS.

"Hot Weather Hints" given below represents a circular issued by one of the plaster companies and the matter is so timely and so practical for the dealers and builder that we give it in full.

Hot weather will affect the setting of hard plaster—if you let it—if you are careless of directions, unmindful of suggestions.

But with just ordinary care, the same thought that you take of your watch, you can prevent any disappointment. Our hard mortars will work just as sure and true as the rising and the setting of the sun—in hot weather, or any weather. Read these hints: (They apply to cement plaster, wood fiber plaster, any kind of hard mortar containing gypsum).

Water.

Rock Gypsum is part water—about 20 per cent of it.

When calcined the water boils out.

It is then no longer Rock Gypsum, it is Plaster of Paris.

In the mixing and application, water is the chemical force that causes re-crystallization, or "setting up." The Plaster of Paris in the mortar changes back into Gypsum Rock.

Bear in mind, then, that Gypsum must have all it wants to drink, in hot weather, or it won't work. If thirsty or "dry" it will be in a hurry to get through, and will only half do its work.

Thirsty Lath.

Remember, too, that materials get "awfully hot" in this hot weather. Wood lath in particular gets very thirsty, and will drink a lot. They'll drink up the water that belongs to the gypsum—drink it right up out of the plaster when you put it on the wall, and let the plaster go dry, if you let 'em.

Plain Plaster Talk.

How to Secure a Perfect Job in Hot Weather.

Things do not generally happen without a reason. Having impressed upon you in the foregoing fashion the chemical principle of hard mortar, the reason for plaster "going dry," we give you, in plain language, the following precautions which, if followed with ordinary care and judgment, will prevent any trouble and insure a perfect plastering job, no matter how hot the weather.

Wet Down the Lath.

Turn the hose on it, soak it good and plenty, wet it thoroughly all over—every spot, then give it a chance to soak, wait an hour or so before you put on the plaster. Then the lath will have all the water it wants, and won't absorb any from the mortar.

If you don't do this, the water in the plaster will be quickly absorbed by the lath (some of it, or most of it, according to how dry the lath are), and not enough left in the mortar to thoroughly set it. By "thoroughly set" we mean every spot, every inch, of the wall, uniformly hard and strong.

Hot Air.

All openings in the house should be carefully screened with cloth or by other means to prevent blasts of hot air from drying up the water in the plaster.

Plaster will set, no matter how long it holds, if it is kept from drying out before it hardens.

If it does dry out before it hardens, "give it another drink" by spraying the wall or sprinkling liberally with a brush.

It is a good plan to sprinkle the floors; it cools the atmosphere, and the plaster will get some of the moisture.

Wait a Little.

If you find the material is holding too long, too slow in setting, it is a good plan to leave the mortar in the mixing box from 20 to 30 minutes after it is mixed. This will give it a chance to thoroughly soak up the water, and will hasten the set considerably. But use judgment; don't make a regular practice of this; only do it when necessary, as explained.

Thin Coats.

If the plaster is applied too thin, it is practically impossible to make a slow setting material get hard without first wetting the lath, for the dry lath will quickly absorb the water from the small body of mortar and it will not set until enough water has been thrown on it to thoroughly wet the lath and leave enough to set the plaster. Save time and bother by wetting the lath first.

Dry Lath Make Trouble.

Dry lath are bound to swell when wet. If you don't swell them before you put on the plaster they will swell and buckle afterward. That makes the plaster warp and crack badly, and it is not the plaster's fault, either.

CONCRETE TILE.

The possibilities of the concrete tile manufacturing business is shown by a statement of what thirty-one counties in the state of Iowa have done with concrete drain tile. Up to and including the year 1910, these thirty-one counties spent $15,200,000 in concrete drainage work. This outlay was for public work only. Private outlay in drainage work in the same counties cost over $60,000,000 in the same time. It has been estimated in the Glenwood, Ia., Opinion that it will take $450,000,000 more to complete the drainage work in the state of Iowa alone. It is now estimated that a total of 30,000 miles of drain are being put in each year, at a cost of $20,000,000.

SAND MERGER.

The sand merger brought about recently by the purchase of the Interstate Sand Company, the Kaw River Sand & Supply Company and the Builders' Sand Company by the Stewart-Peck Sand Company will not result in a high monopoly price on sand, according to H. P. Stewart, of the Stewart-Peck company.

"Sand prices up to a year and a half ago were seventy cents a yard," Mr. Stewart said: "Business became slack and we believed we were on the right track when we cut prices to fifty and sixty cents a yard. We found out later that we had been foolish. The so-called sand war started, and prices went below the margin of profit. The sand business has to carry a heavy load of plant depreciation through floods and ice. Prices probably will go back to seventy cents again."

BIG CEMENT PLANT UNDER CONSTRUCTION.

The Horine Development Co., which now has under construction a large cement mill at Hillsdale, near Lafayette, Ga., has purchased the equipment, costing about $1,500,000, and when completed the plant will represent, including land, limestone, buildings and machinery, about $2,600,000. The plant will combine facilities for manufacturing cement, lime and crushed stone. Contracts have already been secured for over 300,000 tons of crushed stone for delivery in Atlanta and Chattanooga. The holdings of the company are 6,200 acres of land, all paid for, carrying over 400,000 tons of rock.

The Santa Cruz Portland Cement Co. has added white cement to its products. The plant at Santa Cruz, Cal., is the only one in the western part of the United States manufacturing white cement, and white cement sells in San Francisco at $7.00 per barrel.

The American Pulverizer Company, whose general offices were located at suite 410 Mermod-Jaccard building, St. Louis, Mo., has removed to 31st and Ridge streets, East St. Louis, Ill. The change in the location of the offices of the company is made to further the handiness of caring for the details pertaining to the manufacture of their pulverizers and other machinery.

N. L. Morris, of the Utah Glazed Cement Pipe Company, and the Enamel Brick & Concrete Company of Utah, Salt Lake City, Utah, was a caller at the desk of the editor recently. Mr. Morris reported business conditions in both lines represented by him as quite satisfactory in his locality and that a substantial increase in volmue was expected, several new contracts having been secured.

The Goldberg building, Gratiot and Library avenues, Detroit, Mich., is a ten-story and basement structure, in the erection of which sand-lime brick was used exclusively. Richard H. Marr, Detroit, was the architect, and the brick were furnished by the Church Brick Company, of Sibley, Mich.

It is reported from Carson, Nev., that the Pacific Portland Cement Company has purchased the property of the Nevada Gypsum Company. The operation of the plant, however, is being continued on the same lines as before.

Leonard Berrien, for many years in the general building supply business in San Francisco, recently discontinued his business under the name of Leonard Berrien & Co., to devote his time to the interest of the Arden Plaster Company, of Los Angeles. Within a few days after the change took place, the Arden Plaster Company's mill at Arden, Nev., was completely destroyed by fire, but the company will rebuild at once on a much larger scale.

Proposed advances in cement rates over the Atchison, Topeka & Santa Fe and other railroads have been further suspended by the Interstate Commerce Commission until September 30. Originally, the tariffs were suspended until March 30.

CLAY

LOUISVILLE CLAY NEWS.

Louisville, Ky., June 18.—The chief concern of the clay products fraternity hereabouts is that it seems unable to rush deliveries to its customers as rapidly as deliveries are demanded. Outside of that, the trade could not be in finer shape.

But it is a fact that the brick men are having all sorts of trouble with teams, and if someone would import about forty or fifty head of good draught animals and place them at the disposal of the clay workers he could reap $5.00 per day per team and no questions asked. Of course, none of the yards maintain sufficient delivery equipment of their own to handle rush business in the boom season—for every brick man relies to a certain extent upon hired teams. And with the city-wide demand for teams proceeding from the gravel men and the sand men and the cement and lumber men, teams are at a premium and the average brick contractor has to lose a day out of each week because of insufficient material.

At that, the brick yards are circumventing the difficulty as best they may. Every machine in the industry, Chambers or hydraulic, wet mud or shale, is working to the limit of its capacity ten hours per day, and as fast as a kiln cools after being burnt it is loaded up and fired again, for in the midst of the current season the trade feels that it has not a day to lose.

By far the most interesting news of the month in clay products circles is the recent announcement of the Hydraulic Brick Company, the veteran and biggest brick concern in the Falls Cities field, that it will go out of business July 1. This action on the part of the Hydraulic interests has been contemplated for some time, for the men behind the four local yards which have been operated under the same management have decided simultaneously to withdraw their holdings from the field. The company is not all financially embarrassed, but its stockholders have decided upon dissolution as the best method of following out the determination of the company's president, A. Dumesnil, to retire from active connection with the trade.

Whether or not a new company, backed by outside capital, will be formed to take over what remains of the Hydraulic's properties is a matter for the future to decide. Primarily, Mr. Dumesnil and his associates are desirous of disposing of the two remaining yards, one at Twelfth street and St. Louis avenue, and the other at Lochland, a point a few miles south of Louisville on the Princeton division of the Illinois Central Railroad. The eastern yard, located on the Poplar Level road and supplied with equipment capable of producing 35,000 brick per day, has been sold to A. P. Hillenbrand, Sr., a stockholder in the East End Brick Company.

The Hydraulic Brick Company has operated extensively in the local field for fifteen years or more. With the Central yard as a nucleus, the concern built up interests comprising an Eastern, Southern and Western yard, with a fine clay field at Durrett's Lane and the Preston-street road. Donald McDonald, the late George M. Boone, Charles Doherty, James Clark, Jr., Walter S. Adams, C. A. Stout and other well-known business men have associated themselves with President Dumesnil in the company for ten years past.

The Hydraulic is now delivering from a big stock and expects to close out this work by July 1, the date when "taps" will sound for the pioneer concern. With the Eastern yard sold, the officers of the company have excellent prospects of disposing of the remaining properties and it is probable that the affairs of the corporation will be wound up suitable for dissolution by the date set.

A. P. Hillenbrand, Sr., who has purchased the Eastern yard of the Hydraulic Brick Company, has announced that he will probably re-commence operating the Poplar Level road plant within thirty days. Mr. Hillenbrand has not yet decided whether he will run the yard individually or will form a company to back it. His son is associated with R. B. Crane and others in the East End Brick Company.

The Southern Brick & Tile Company, according to T. Bishop, its president, has all the work it can handle comfortably. The Southern company is delivering a portion of the big brick order demanded by A. Bentley & Son, the general contractors who are erecting the new $1,000,000 City Hospital in Louisville. It is estimated that upwards of 4,000,000 common hard brick will be demanded for the curtain walls of the civic institution, which is to be one of the finest of its kind in the United States when it is completed. The Southern Brick & Tile Company has also handled a lot of tile work during the month, furnishing material for extensive drainage systems that were set in Cherokee Park, Louisville, and in a beautiful country estate on Salt river, about twenty miles out in the state.

Furnishing all of the terra cotta necessary for the 18-story skyscraper that has been erected by the Inter-Southern Life Insurance Company at Fifth and Jefferson streets is only one of the big things accomplished by the P. Bannon Sewer Pipe Company during the month. The company is busier now than it ever has been before at this time of the year. Joseph Cicotte, formerly superintendent of the Central yard of the Hydraulic Brick Company and at one time connected with the Hydraulic Press Brick Company, of St. Louis, Mo., has resigned his position with the local concern which is pending dissolution and is installed as superintendent of the Bannon yard. Mr. Cicotte is one of the best known brick burners in the Ohio valley.

Gleen Youmans is the new superintendent at the William E. Dee Clay Works at Newport, Ind., succeeding William P. Grimm.

MINE TAILINGS EXTENSIVELY USED IN MISSOURI.

During the past few years the Chats or Mine Tailings produced in the Joplin and Flat River districts have become an important factor in the stone industry of southeast and southwest Missouri. According to figures obtained by the Missouri Geological Survey more than 1,500,000 tons of this material were used in 1911.

In commercial work chats is used chiefly for concrete and as a road metal; it is also extensively used for railroad ballast.

The following table indicates the tonnage of this material used for both railroad and commercial purposes since 1909.

	1909.	1910.	1911.
Railroad Purposes....	355,901	1,009,533	865,011
Commercial Purposes..	472,935	610,789	638,592
Total.....	828,835	1,620,322	1,503,603

During 1911 there were approximately 1,015,800 tons shipped from the Southwest zinc district while the Southeast lead district shipped approximately 487,800 tons. More than one-half of the total tonnage has been used for railroad ballast, being utilized chiefly by those roads traversing the various mining districts. The many miles of macadamized roads of Jasper county speak for the efficiency of this material as the cheap road metal. Although the limestone is rather soft, when mixed with oil or asphalt it results in an almost dustless road.

The various mining districts produce millions of tons of Chats yearly and the great tailings piles offer an almost limitless supply of this material for constructional purposes. Since the material is already crushed, the cost of utilization is largely that of haulage.

The commercial use of Chats could be greatly increased outside of the mining districts.

A copy of "Concrete Costs," by Frederick W. Taylor, M. E. Sc. D., and Sanford E. Thompson, S. B., has come to the desk of the editor, and a perusal of its contents is sufficient to warrant the statement that it is truly a meritorious and comprehensive work.

Concrete Costs is designed to meet the needs of the contractor, as well as of the engineer and architect, and contains tables and recommendations for estimating the time and cost of labor operations in concrete construction, and for introducing economical methods of management.

The book contains 710 pages, is divided into many chapters and is sumptuously illustrated with tables and diagrams. It is a thorough and exhaustive treatment of the cost of concrete operations, going into great detail on the subject of concrete construction, and also treats the subject of plant installation with great clearness.

Concrete Costs is handsomely and substantially bound and the price is $5.00. Copies may be secured by writing to John Wiley & Sons, Scientific Publishers, 43 and 45 East 19th St., New York, N. Y.

The Aberthaw Construction Company, Boston, is erecting a reinforced concrete bridge over the Spickett River at Methuen, Mass.

SAND-LIME BRICK

SAND-LIME BRICK IN MASSACHUSETTS.

The Worcester (Mass.) Sand-Lime Co., incorporated under the laws of Massachusetts, with a capital stock of $150,000, proposes to erect a plant in the western part of the town of Worcester, on the Boston & Albany Division Railroad. The officers of the company are: President, Richard C. Cleveland; vice-president and treasurer, E. Lincoln Powers; and secretary, Farnham V. Curtis. The factory will have a capacity of 40,000 brick per day, and the company will make a specialty of gray brick, although other colors will also be made.

SAND-LIME PLANT IN CUBA.

W. J. Carmichael, of the American Clay Machinery Co., by his several trips to Mexico, has acquired a familiarity with the Spanish language, which especially fits him for the work he is now carrying on, i. e., the establishing of a big sand-lime brick plant in Cuba.

SAND-LIME NEWS.

The Range Sand-Lime Brick Co., composed of Minneapolis, Duluth and Range capitalists, is erecting at Pengilley, three miles east of Calumet, Minn., on the Duluth, Missabe & N. R. R., a sand-lime brick plant which, when completed, it is said, will be one of the largest and best equipped plants of its kind in the United States.

The plant will be capable of turning out 100,000 bricks per day, and from present indications the output will be sold in advance of the day that the plant is to begin operations. It is planned to have everything in order and ready for operation in sufficient time for the spring trade. The company is also erecting, in connection with the brick plant, a hydraulic plant for the hydrating of lime for their own use as well as the commercial trade in that locality, lime brick near Worcester, Mass., and a company is to be organized in Worcester for the purpose of maintaining and operating the plant. The sand at that point is said to be peculiarly adapted to the manufacture of sand-lime brick. F. L. Power, of Worcester, is mentioned as being a prominent factor in the organization of the local company. No detailed statement of the plans for the construction of the factory have as yet been given out.

INCREASE IN CEMENT RATES SUSPENDED.

Increased rates on cement from Union Bridge, Md., for Norfolk, and other destinations which the Western Maryland Railway announced to go in effect March 7, have been ordered suspended by the Interstate Commerce Commission until July 5.

The Saginaw Brick Company, Saginaw, Mich., furnished the sand-lime brick used in the construction of the Somers Bros.' match factory, Saginaw, Mich. Eight hundred thousand brick were used, and the building is a model plant in every respect and is designed to be absolutely fireproof.

Washington Silicate Brick Co., in letter, writes: "Since the spring has opened up the demand in the City of Washington is very large, with the result that the output of our works can be disposed of readily in the city."

It now has a contract to furnish about a quarter million sand-lime brick for Dupont Hotel, to be built adjoining the Dupont building, which is to correspond in architecture, and is designed and to be built by the Manufacturers' Contracting Co., Wilmington, Del.

The Washington Silicate Brick Co. has also taken a contract to furnish the brick for twenty-one houses to be built on New Hampshire avenue, Washington, D. C. Architect, John M. Donn, 1516 H street, N. W.; owner, C. B. Hight, Colorado building, Washington, D. C.

The company recently purchased the interests of the Terra Cotta Co., Washington, D. C., which furnished 1,750,000 sand-lime brick used in the construction of the Dupont building, Wilmington, Del.

Church Brick Co., Silbey, Mich., reports that in spite of the severe winter, the volume of business for the first six months of this year has been in excess of the corresponding period of last year and promises a fine season.

EMPIRE LIMESTONE COMPANY.

When it's a question of sand, western New York contractors are never at loss, as unlimited supplies, facilities, etc., are presented at Buffalo second to none, whether it be gravel, grit or the finer grades; all are practically within reach at a moment's notice.

The Empire Limestone Company, of Buffalo, realized the natural advantages and commercial possi-

SAND AND GRAVEL YARDS OF THE EMPIRE COMPANY AT FOURTH AND VIRGINIA STREETS.

bilities of these conditions years ago, and today stands foremost in the industry. The yarding facilities of this firm are perfect; located at the foot of Virginia street, both rail and water accommodations are within touch, with its full complement of derricks, loading and other mechanical accessories.

Niagara river washed gravel, which has found favor with concrete workers, conforming as it does with every requirement, has received a good share of the Empire company's attention, and a fleet of steel pumping boats of modern construction is constantly employed to keep abreast of this ever-increasing industry. The New York state barge canal, now under construction, with its mammoth locks and flood-gates and walls of concrete, make great demands on the gravel output of this section, and this firm ships vast cargoes for this purpose.

The Canadian field is drawn upon for the sand of quality, such as for locomotive and foundry core uses, yielding unlimited supplies. At the Ganson street yard vast areas of this commodity are always at hand for immediate use, with a number of 5-ton motor trucks for quick delivery.

While the original mission of this company was

GANSON STREET RAILROAD YARD WITH UNLOADING DERRICK AND ONE OF THE EMPIRE COMPANY'S PUMPING BOATS.

the quarrying of limestone the call of the trade in other branches has superseded it, notwithstanding long-year contracts with several large steel plants for fluxing material. Quarries are maintained at Le Roy, N. Y., Palmyra, N. Y., and Sharkston, Ont.

It is interesting to note the improved method of loading sand and gravel by the use of the massive steel hoppers employed here. Of original construction, they embody essentials far superior to the old method, it being possible by the simple manipulation of a lever to fill a truck in the short space of 30 seconds.

The Empire Company easily stands at the head of the sand and gravel industry in western New York, which, while a rather broad statement, seemingly, in the face of considerable competition, is nevertheless only just. Its equipment, of modern excellence, the yarding facilities and the resources presented give it at once a superiority over competitiors undeniable. This is attested in a measure by the fact that about 75 per cent of the mason and contributory material is supplied by this firm.

With a building boom now at its height in Buffalo, it is a foregone conclusion that a banner season is in view. New offices of more adequate facilities are now in the course of completion at the foot of Hudson street. Branch yards are also maintained at Niagara Falls and Tonawanda, N. Y.

The John Mitchell Company, 308 Sixth street, Jersey City, N. J., builders and contractors. Capital, $6,000. Incorporators, R. L. Mitchell, 89 Highland avenue; Anna M. Freese, 89 Highland avenue, and George H. Feldner, 308 Sixth street, all of Jersey City, N. J.

The Dolarway Paving Company, of New Jersey, Main street, Netcong, N. J., all kinds of paving work. Capital, $3,000. Incorporators, H. K. Salmon, Stanhope, N. J.; J. B. Salmon, Hackettstown, N. J., and F. B. Earl, of East Orange, N. J.

The Cumberland Sand Company, 615 N. Eighth street, Camden, N. J., to quarry sand, gravel, clay, stone, etc. Capital, $50,000. Incorporators, O. C. Lippincott, 135 S. Second street, Philadelphia, Pa.; George McQuilkin, Jr., 815 N. Eighth street, Camden, N. J., and J. Burton Mustin, 425 West Johnston street, Philadelphia, Pa.

The M. Sipporta Building & Contracting Company, 4 Christy street, Lodi, N. J., builders and contractors. Capital, $25,000. The incorporators are M. Sipporta and M. A. Sipporta, of 4 Christy street, Lodi, N. J., and L. Paolo, 544 Third avenue, New York City.

GIANT GRIFFIN MILL.

We are informed that the Bradley Pulverizer Company has made arrangements for the manufacture of the Giant Griffin Mill and parts at the Allentown (Pa.) works and are continuing the manufacture of the Bradley Three Roll mill for fertilizer use in grinding phosphate rock and Florida pebble at the Boston Works. This has been necessary on account of the demand for the Bradley Three Roll mill for use in the fertilizer business. An officer of the company says: "On account of the successful operation of the Giant Griffin Mill and its predecessor the 30" (Original) Griffin mill it has been understood by some that we only manufacture pulverizers for the cement trade. This is now only part of our large business, as the Bradley Three Roll Mill is being used in a majority of the fertilizer plants on account of its simplicity of operation and economy in up-keep with only thirty-five horsepower.

"Not only are the phosphate rock grinding people beginning to realize the value of the Bradley Three Roll mill but also the fire clay manufacturers are installing them for grinding tailings. One recent installation of a Bradley Three Roll Mill at the plant of the Olive Hill Fire Brick Company, Olive Hill, Ky., is giving an output of from 10 to 15 tons per hour at a very low cost of up-keep.

"Another use for the Bradley Three Roll is the grinding of limestone for agricultural lime purposes. This commodity is being used universally and is becoming very popular with the farmer. We have just installed one of these mills at Medina, N. Y., for this purpose, and we are in receipt of some very flattering reports on the outcome of tests made at that plant.

"Probably the reason for the great popularity of both the Giant Griffin and the Bradley Three Roll is on account of their being self-contained machines, requiring no auxiliary screens for procuring necessary fineness. This is a great point in favor of all our different mills and is required by the trade we serve. Auxiliary screens and the additional elevators they require are a source of trouble and expensive in up-keep and horsepower.

"Another point in our favor is the fineness of the grind. It is a known fact that the Giant Griffin Mill is the finest grinder on cement clinker that has ever been used. Also the Bradley Three Roll Mill will give a greater percentage of 200 mesh material. This is quite essential in both the grinding of phosphate rock for fertilizer purposes and the grinding of limestone for agricultural lime. The average mills used for this purpose are not suited to the use of the ordinary operator, being too complicated and require the attention of skilled mechanics. Any operator with ordinary judgment can operate the Bradley Three Roll mill very satisfactorily.

"It is now about twenty-five years since we started to build Griffin Mills and there are more of these mills in successful use than all other mills combined. We have kept abreast of the times carrying on extensive experiments and tests, continually trying if possible to improve our various mills. In this we have been quite successful, as the great number of installations of both the Giant Griffin and Bradley Three Roll Mills will show. As it has been necessary we have made improvements on both of the above mentioned mills and are satisfied that for fineness of grind, low cost of up-keep and economy in horsepower there is no other mill that compare with them.

"The grinding of phosphate rock in connection with the fertilizer business being a much newer proposition than that of grinding cement materials

GIANT GRIFFIN MILL.

the number of installations are not as great, but the success which all our users are having assures us of a larger business in the future that will equal our great success in the cement business.

"We have some exceptionally good data on up-keep, horsepower consumed and fineness of grind

BRADLEY 3 ROLL MILL.

which we will be very glad to furnish to interested parties.

"If you see fit to use the above as a news item in your journal we will appreciate it very much."

CEMENT MERGER MAY FAIL.

Kansas City, Mo.—The proposed cement merger of some fifteen companies west of the Mississippi river may fail. Three months ago it appeared that it would be a success and the incorporation papers were drawn. Dissatisfaction arose over the terms of the merger and the appraisement of some of the plants. Representatives of the fifteen companies are in conference in Kansas City this week. Hiram Norcross, an attorney who is negotiating the proposed merger, said that the prospects are not so encouraging.

CLASSIFIED ADVERTISEMENTS placed in ROCK PRODUCTS are quick and sure result bringers. If you are in need of or wish to sell anything, or desire employes or employment—a Classified Advertisement in ROCK PRODUCTS will accomplish the desired result. This is amply attested to by the long list of satisfied users in ROCK PRODUCTS, Classified Columns.

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L. J. Mensch. Price $2.00.

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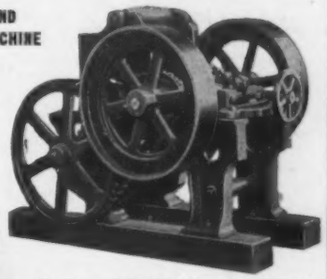

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ROCK PRODUCTS

Index to Advertisements

JUNE 22, 1912

Aetna Powder Co. 17
Allen, Edgar, American Manganese Steel Co. 38
Allis-Chalmers Co. 9
Alpha Portland Cement Co. 2
Aluminate Patents Co. 16
American Clay Machine Co. 71
American Fabric Belt Co. 38
American Locomotive Co. 4
American Process Co. 18
American Steel Fdy. 9
American Steel & Wire Co. 57
Anchor Concrete Stone Co. 69
Atlas Car & Mfg. Co. 72
Atlas Portland Cement Co. 72
Austin Mfg. Co. 9
Automatic Weighing Machine Co. 65

Bacon, C. Earle 11
Barrett Mfg. Co. 58
Bartlett, C. O., & Snow Co., The 59
Bates Valve Bag Co., The 15
Belt, C. T. 54
Best Bros. Keene's Cement Co. 68
Bonnell, John Harper 36
Bonnot Co., The 10
Books for the Trade 53
Bradley Pulv. Co. 4
Buckbee, J. C., Co. 69
Buffalo Wire Works Co. 60
Buhler, Edw. E., Co. 67
Burrell Mfg. Co. 8
Butterworth & Lowe 62

Cabot, Samuel, Inc. 55
Caldwell, H. W., & Son Co. 59
Canada Cement Co. 2
Carman, F. L. 54
Carolina Portland Cement Co. 1
Century Cement Mach. Co. 70
Chalmers & Williams 5
Chattanooga Paint Co. 70
Chicago Belting Co. 1
Chicago Portland Cement Co. 35
Chrome Steel Works 11
Classified Business Directory 56
Clinton Metallic Paint Co. 70
Coldwell-Wilcox Co. 9
Copiay Cement Mfg. Co. 36
Commers & Son Co., F. D. 18-68
Cyclone Quarry Drill Co. 61

Davenport Loco. Works 71
Dexter Portland Cement 1
Dull & Co., Raymond W. 61
Dunning, W. D. 71
DuPont Powder Co. 17

Ehrsam, J. B., & Sons, Mfg. Co. 63

Farnham Cheshire Lime Co. 18
Farrell Fdy. Mche. Co. 11
Fowler & Pay 70
Francis Mchy. Co. 54
French, Samuel H., & Co. 1
Fuller Eng. Co. 38

Good Roads Construction Co. 53

Hendrick Mfg. Co. 38
Howells Mining Drill Co. 61
Houston Bros. Co. 36
Hunt, Robt. W., Co. 36

Improved Equipment Co. 18
Ironton Portland Cement Co. 2
Industrial Car Co. 38

Jeffrey Mfg. Co. 5
Johnson & Chapman Co. 60
Jones, F. A. 54

Kansas City Pt. Ct. Works 35
Kelley Island Lime & Trans. Co. 12
Kent Mill Co. 10
Kilbourne & Jacobs Mfg. Co. 53
King, J. B., Co. 62-64
Koehler, Hy. L., Mfg. Co., The 1
Kritzer Company, The 14
Knickerbocker Port Cement Co. 7

Lauman, A. H. 13
Lehigh Portland Cement Co. 2
Lewiston Fdy. & Mche. Co. 60
Link Belt Co. 59
Louisville Fire Brick Works. 8

McLanahan Stone Mchy Co. 60
Macneal, Jas. B., & Co. 54
Marblehead Lime Co. 13
Marsh Co. 55
Martin, Henry, Brick Machine Mfg. Co. 55
Maumee Chemical Co. 38
Meacham & Wright 36
Meyer, W. D. 54
Miller, Clifford L., & Co. 12
Miscampell, H. 16
Mitchell Lime Co. 12

National Lime & Stone Co. 12
National Mortar & Supply Co. 13
National Retarder Co. 65
Niagara Gypsum Co. 67
Northwestern States P. C. Co. 2
Northwestern Steel & Iron Works 72
Nuttall, R. D., Co. 11

Ohio & Western Lime Co. 13
Ottawa Silica Co. 1-36

Pennsylvania Crusher Co. 2
Pettyjohn Co., The 70
Phoenix Portland Cement Co. 1
Plymouth Gypsum Co., The 68

Raymond Bros. Impact Pul-Co., The 8
Read & Morrill, Inc. 70
Reed, M. A. 67
Ricketson Mineral Paint Wks. 68
Rock Plaster Mfg. Co. 36
Ruggles-Cole Eng. Co. 17

Sandusky Portland Cement Co. 18
Scioto Lime & Stone Co. 13
Schott, Dr. Otto 54
Security Cement & Lime Co. 35
Smidth, F. L. 60
Smith, T. L. Co., The 5
Standard Scale & Supply Co. 69
Stephens-Adamson Mfg. Co. 37
St. Louis Portland Cement Co. 35
Sturtevant Mill Co. 58
Symons Bros. 6

Taylor Iron & Steel Co. 9
Troy Wagon Works Co. 62

Ubbink Steel Form Co. 38
Union Mining Co. 1
Union Sand & Material Co. 35
United States Gypsum Co. 66
United Wire Tire Co., The 16
Universal Portland Cement Co. 37
Urschel Bates Valve Bag Co. 62

Wadsworth-Howland Co. 57
Webster Mfg. Co. 58
Weller Mfg. Co. 15
West Jersey Bag Co. 35
Whitehall Portland Cement Mfg. Co. 36
Williams, C. K., & Co. 54
Williams Patent Crusher and Pulverizer Co. 11-6
Wolverine Portland Cement Co. 2
Worrell, S. E. 18
Wolfe & Misner 68

Yates, Preston K. 54
York Hotel 8

CLASSIFIED BUSINESS DIRECTORY

BAGS.

Bates Valve Bag Co.
Orschel Bates Valve Bag Co.
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Dexter Portland Cement Co.
French, Samuel H., & Co.
Hartranft, Wm. G., Cement Co.
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Knickerbocker Portland Cement Co.
Ironton Portland Cement Co.
Lehigh Portland Cement Co.
Meacham & Wright Co.
Northwestern States Portland Cement Co.
Phoenix Portland Cement Co.
Sandusky Portland Cement Co.
St. Louis Portland Cement Works
Security Cement & Lime Co.
Union Sand & Material Co.
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Whitehall Portland Cement Mfg. Co.
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CLAY PRODUCTS.

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Kent Mill Co.
Lewistown Foundry & Machine Co.
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Martin, Henry.
McLanahan Stone Machine Co.
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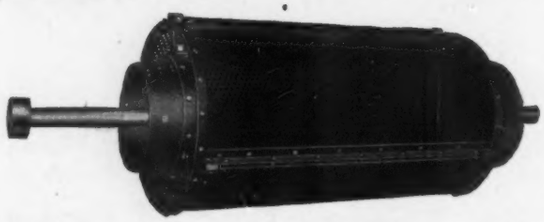

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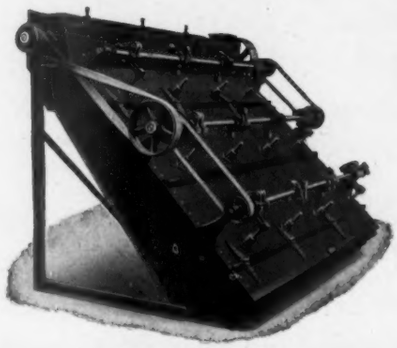

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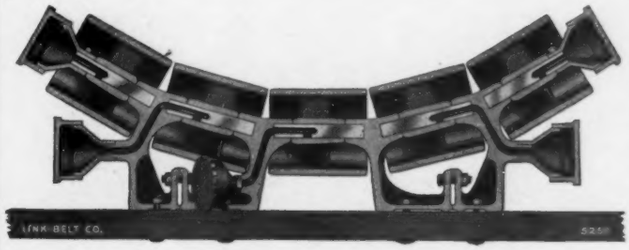

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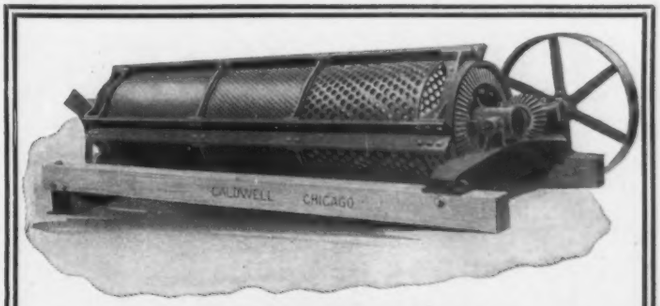

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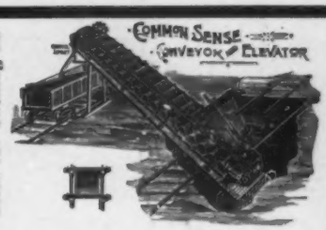

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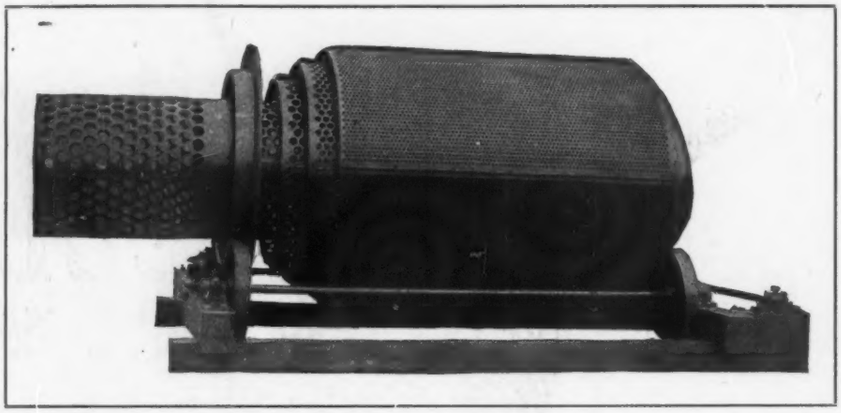

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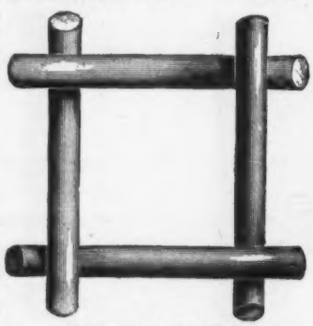

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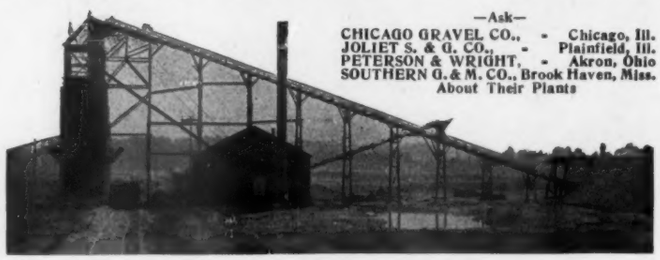

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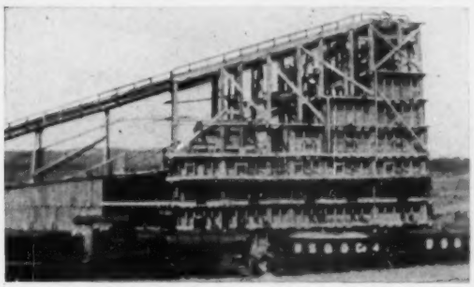

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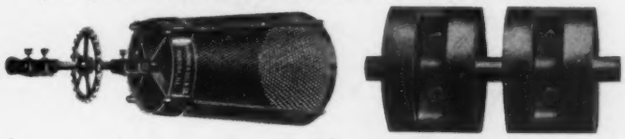

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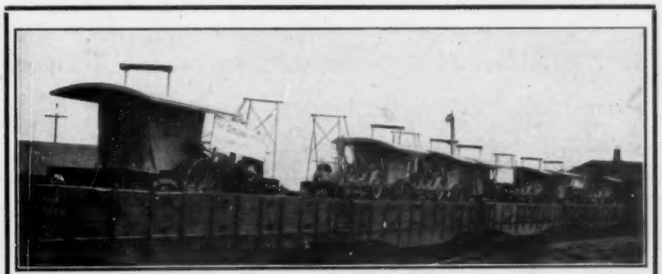

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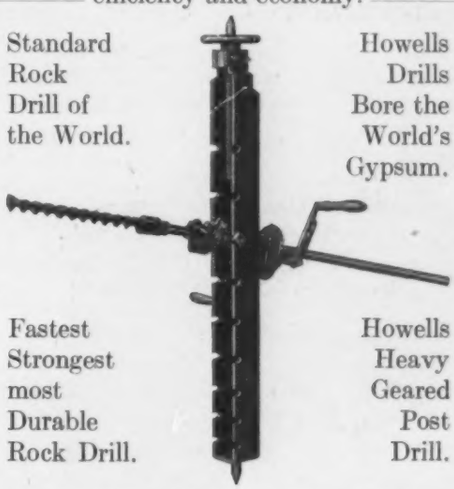

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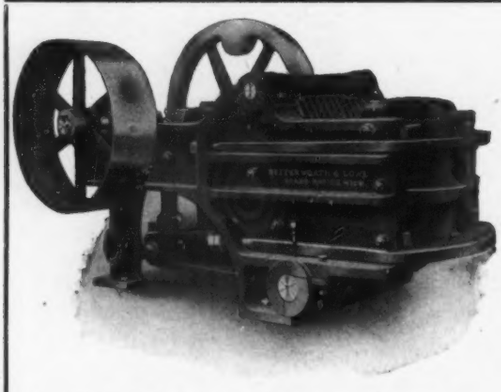

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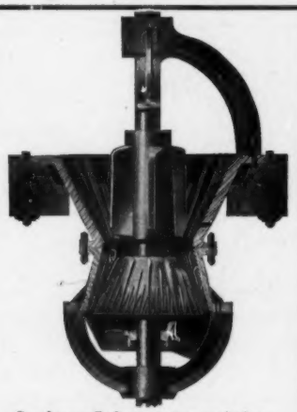

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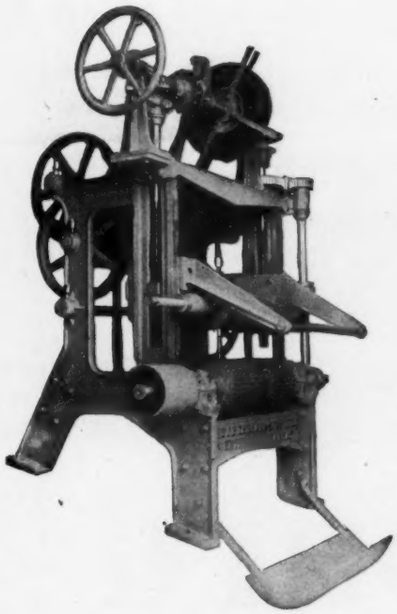

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The log feeds itself to the saw. As the log decreases in diameter the Speed of the log and of the feed INCREASES AUTOMATICALLY.
In other words, the Peripheral Speed remains constant.
The feed of the log to the saw is in direct proportion to the speed of the log.
This automatic uniformity of feed INSURES UNIFORMITY of FINENESS in the PRODUCT.
No frictional devices are used, none being necessary.
All the working parts are planed. All of the gears are cut from solid steel.
All of the parts are interchangeable and numbered, so that duplicate parts can be quickly obtained and easily put in position
The Saw mandril is extra heavy and made of the best crucible steel.
The journals are chain oiling. No machine can be more substantially built. Write for full information.

Okeene, Okla., June 14, 1911.

J. B. Ehrsam & Sons, Enterprise, Kans.,
Gentlemen:—Some time ago I received a letter from you asking how the wood fibre machine you shipped us is doing. Will say it is the best I ever used. In regard to any suggestions I could make as to how it might be improved, will say that I can make none, as it is O. K. Yours truly, SOUTHWEST CEMENT PLASTER CO.,
Frank Dodge, Sup't.

Manufacturers of Jaw and Rotary Crushers for Gypsum, Vibrating Screens, Hair Pickers, Wood Fibre Machines, Calcining Kettles, Plaster Mixers, Power Transmission

The Enterprise Vertical Burr Mill

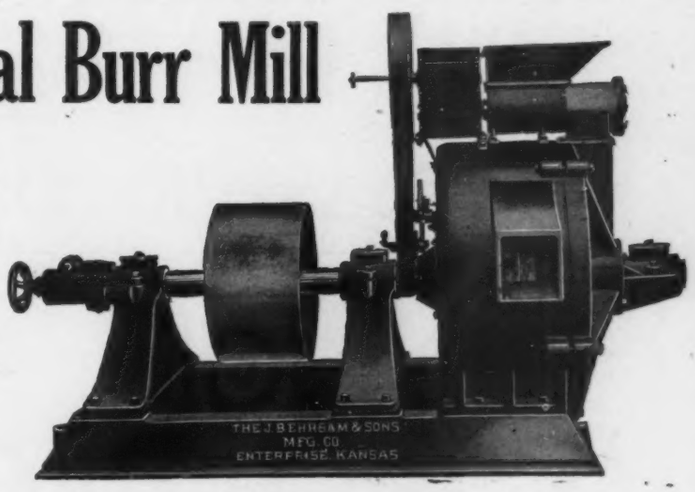
is especially designed for grinding gypsum, limestone, coal, coke, paint, rock, foundry facing, carbon, salt, and other similar substances.

It is STRONG and DURABLY built.

Has INTERCHANGEABLE STONES, which can be easily removed for dressing and replaced.

Is provided with our POSITIVE CONTROLLABLE FEEDER, which feeds an absolutely uniform stream into the mill at the required capacity.

MANY OTHER ADVANTAGES.



The J. B. Ehrsam & Sons Mfg. Co.

Designers and Builders of

Complete Equipment for Plaster Mills

ENTERPRISE, KANSAS, U. S. A.

Improved
Modern
Lath

TRADE MARK
J.B. KING & CO.
FIBROUS PLASTER BOARD
DIAMOND BRAND
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REGISTERED IN U. S. AMERICA

Fire-Proof
Insulating
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King's Fibrous Plaster Board

Standard Size 32' x 36'

THE RESULT OF "TRADE DEMANDS"

STRENGTHENED to stand the GREATEST STRAIN to which such material is subjected
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SHIPMENTS made to dealers of STRAIGHT OR MIXED CAR LOADS

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PLASTER BOARD NAILS

SERVICE The location of our works at the greatest railroad terminus in the East and our several warehouses enable us to make **Prompt Shipments at all times.**

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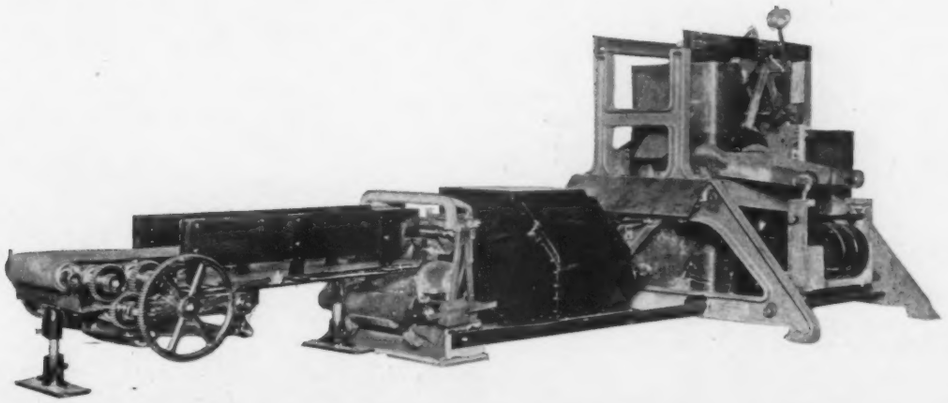
Norfolk, Va. Buffalo, N. Y.
Brunswick, Ga.

WORKS:
New Brighton, Staten Island,
NEW YORK



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CLINKER AND GYPSUM

Your chemist, with this machine, will give the desired result

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Mills at
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Successors to

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The Binns Stucco Retarder Co.
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The same standard quality of retarder will be produced and marketed by the same people at the right price—only a change in name of corporation.

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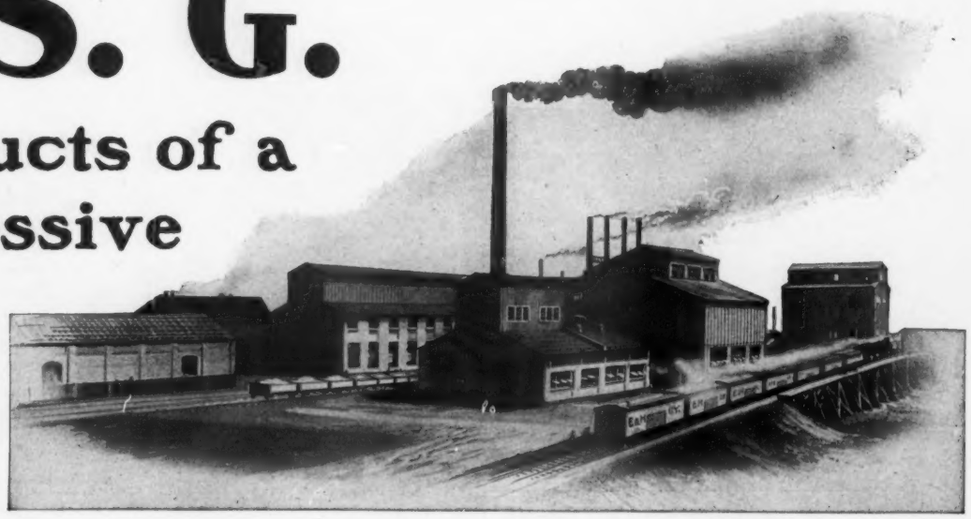

The Mills That Make Them

¶Here is our standard type of U. S. G. Mill construction—**the most modern and perfectly equipped plaster making plants in the world.**

¶All our mills and the machinery peculiar to our business are designed entirely by our own engineers. ¶**U. S. G. products** are superior because **back of the goods** you have the assurance of uniform equipment, modern facilities and the established purity of our raw materials.

¶Know **U. S. G. Products** and you know **satisfaction.** The trade-mark is a protection for Dealers, Architects, Contractors and owners alike—it has always stood for the **very best** in building materials—nothing is left undone to keep the record clean. ¶It will pay you to do business with us for we know the full value of good service and render it every day in the year.

SACKETT Plaster Board
Gypsinite Fireproof Studs
Pyrobar Gypsum Tile
U. S. G. Cement Plasters
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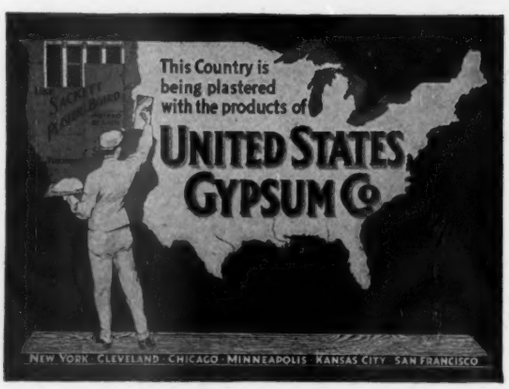
Cementico Wall Tints, Etc.


This Country is being plastered with the products of
UNITED STATES GYPSUM Co
NEW YORK CLEVELAND CHICAGO MINNEAPOLIS KANSAS CITY SAN FRANCISCO

U. S. G. Products and methods will increase your business and profits and enable you to give greater satisfaction to your trade.

PEERLESS

means without an equal and that is what our products are beyond the shadow of a doubt.

Peerless Plaster-Board

The Best on the Market To-day

Peerless Plaster Board has no superior on the market today. Strength, durability, and uniformity in thickness with clean cut edges are its chief virtues.

Peerless Plaster Board finished with **Peerless Plaster** make a Peerless Wall. Builders' Supply Retailers say it is the best Plaster Board manufactured. If you are "from Missouri" write us today for sample and prices.

Write today for our
PEERLESS PROPOSITION

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(Exterior Plastering)

We Ship Mixed Cars of Plaster and Board

Peerless Plaster Board comes in sheets 32 inches by 36 inches.

Peerless Plaster Board is a fire retardent and an efficient sound deadener.

Peerless Plaster Board is a non-conductor of heat and cold.

Peerless Plaster Board is an insurance against cracks, buckles, and lath stains.

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THE PEERLESS LINE
WRITE TODAY

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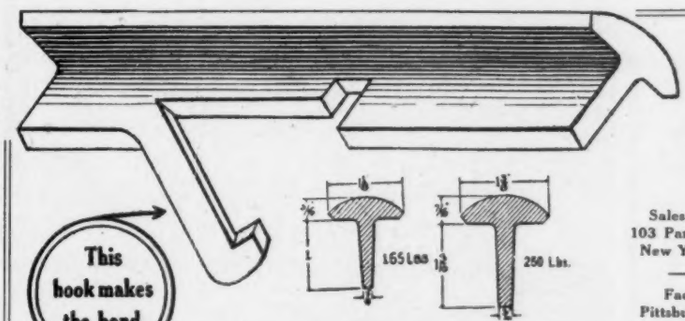

The Ebco Hook Curb Bar

Is a steel member to be embedded when the concrete is poured, forming a permanent projecting edge and acting as a re-inforcing member as well. City engineers and contractors who have had trouble with the old sand-stone curbs or with plain concrete curbing, realize the need of a curb whose corner is properly protected against wear. ∴ Write for circulars.

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Factory:
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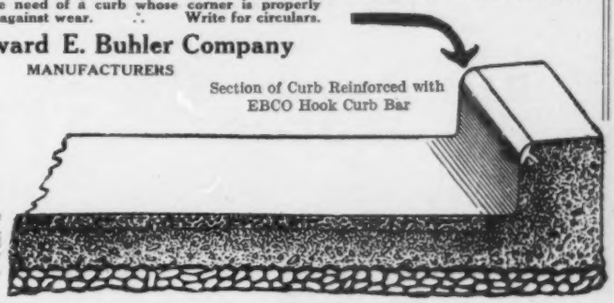

Baltimore, Agents: Hudson Cement and Supply Co., Baltimore, Md. Western Agents: Waterhouse Price Co., San Francisco, Cal. Akron and Canton Agent: Fred Fogarty, Akron, O. Louisiana, Agents: Standard Paving & Construction Co., 321 Godchaux Bldg., New Orleans, La. Montreal Agents: Stinson-Reeb Builders Supply Co., Ltd., Montreal, Canada. Steubenville, Ohio: Central Sewer Pipe & Supply Co. Indianapolis, Ind.: Indianapolis Mortar & Fuel Co., 407 Oddfellow Bldg. Detroit, Mich.: F. G. Hall, McGraw Bldg. Pittsburgh, Pa.: Houston, Bros., 32nd St. & Pennsylvania, Ave., Albany, N. Y.: Albany Bldrs. & Supply Co.

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That Is Led By
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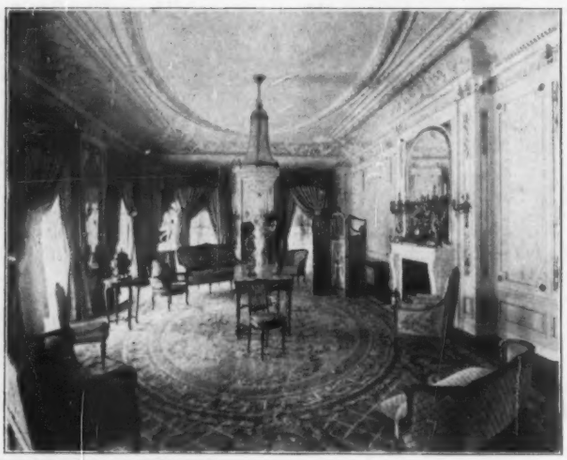
FOR HOUSES BEAUTIFUL



R. A. Long Residence, Kansas City, Mo. Henry F. Hoit, Architect

NEVER has there been discovered any other plastering material so supremely adaptable for walls, columns and decorations as **Best Brothers Keene's Cement.** It goes on easily; and **once set,** is on to stay. It does not deteriorate with age; for passing years serve but to strengthen walls plastered with Keene's Cement. It forever does away with the **ugly jabs** and **scars** that so commonly disfigure **ordinary** plastering.

Hundreds of comparative tests have proved Best Bros. Keene's Cement to be the toughest, most durable, trouble-proof plaster in existence.

With unequaled durability **Best Bros. Keene's Cement** combines certain **sanitary** qualities that have caused it to be used extensively in many of the greatest hospitals as well as in a vast number of public and private buildings. It has stood the time test of nearly a **quarter of a century** and has won the favor of hundreds of well-known architects and builders who use it wherever possible.

"The Inner Wall" on Request

Write for this book today. It tells all about **Best Bros. Keene's Cement** and the wonderful service it is rendering. Gives names of hundreds of buildings where used and the architects for the same. Every builder and architect should get the facts in this book. Write today.

THE BEST BROS. KEENE'S CEMENT CO., Dept. C, Medicine Lodge, Kansas

Established 1889 **New York Office—The Fifth Avenue Building**

(2)

RICKETSON'S MORTAR COLORS

YOU CAN'T FADE 'EM

There's one "best" in every line, but that is not always best for everyone concerned. In the building trades

Ricketson's Mineral COLORS

are acknowledged to be the best choice for *everybody*. Best for the architect because purest. Best for the contractor because they go farther. Best for the owner because they never change their color.

For Mortar, Brick, Cement, Stone, Etc.
Red, Brown, Buff, Purple and Black

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CUMMER CONTINUOUS PROCESS
FOR
CALCINING GYPSUM

NO KETTLES USED — PLANTS IN OPERATION

Great Saving in Cost of Manufacture and Quality of Product Guaranteed.

The F. D. CUMMER & SON CO., Cleveland, O.

THE STUCCO THAT STICKS

Most architects and builders have had trouble with stucco work cracking and peeling off. They have also found it difficult to get a uniform color that will last. The solution of these troubles is the use of

"ORIENTAL" STUCCO

MADE IN ALL COLORS

ALSO BASE COAT

Prepared stucco, shipped anywhere. Just add water and it's ready to apply. Remember: Oriental Stucco is slow setting, bonds perfectly and will not peel off. Its color is permanent. Superior to cement and sand stucco. Also manufacturers of interior colored finish. *Write for catalog and color card.*

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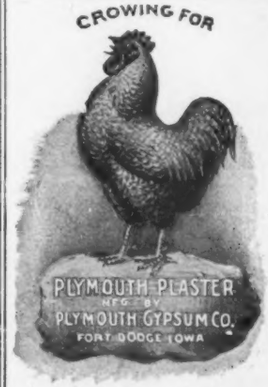

PLYMOUTH PLASTER
WOOD FIBER PLASTER
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PARTITION BLOCKS
PLASTER BOARD
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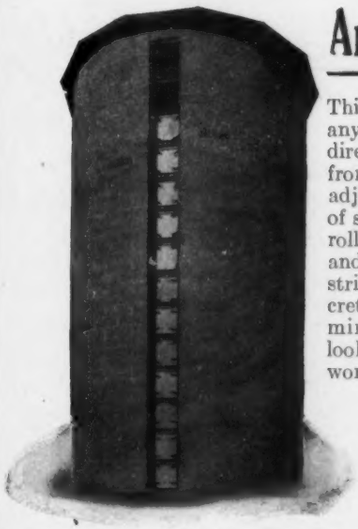
THE QUALITY BRANDS

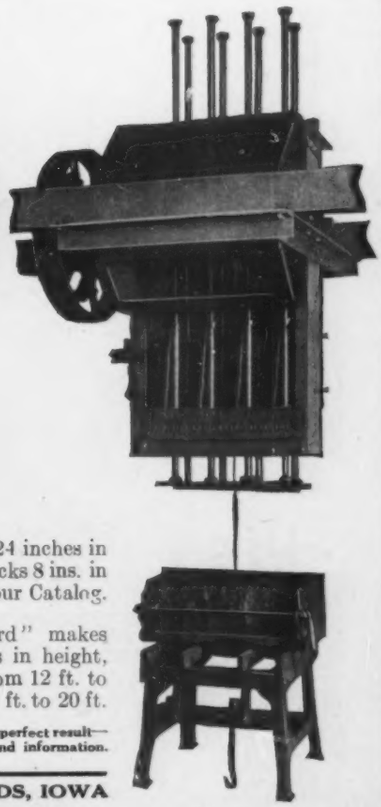
WRITE US FOR PRICES AND ADVERTISING MATTER

Plymouth Gypsum Co.
Fort Dodge, Iowa



Anchor Automatic Tamper

This great labor saving machine does not require any room in your factory except the space directly above the mold box. It is suspended from heavy frame work on the ceiling. Can be adjusted to fit any machine or used for all kinds of special work. The eight tampers are raised by roller crank-arms and each tamper strikes the concrete 75 times per minute. Better look into this little wonder.



Anchor Block Machines

Made in two sizes. Our "Standard" makes blocks that lay in the wall 8 inches in height, and 24 inches in length, of any width, such as 8, 9, 10, 11 and 12 inches, five sets of face plates. Our "Junior" makes blocks 8 ins. in height and 16 ins. in length, of any width such as 8, 9, 10, 11 and 12 ins., four sets of face plates. Get our Catalog.

Anchor Adjustable Silo Block Machines

Made in two sizes. The "Standard" makes blocks that lay in the wall 8 inches in height, 24 inches in length, of any circle from 12 ft. to 20 ft. The "Junior" makes blocks 8 inches in height, 16 inches in length, making any circle from 12 ft. to 20 ft.

Continuous Air Space is the principle upon which lies the prestige of Anchor Concrete Blocks and Silo Blocks. They are giving the only perfect result—a dry inner wall, impregnable to heat, cold or moisture. Investigate this system of block construction by sending for our catalogue and information.

Anchor Concrete Stone Company ROCK RAPIDS, IOWA

"THE STANDARD" Low Charging Concrete Mixer With "CART CHARGER"

"The Standard" "Cart Charger" is designed to use the power on the mixer to bring loaded carts from the material piles to the mixer platform.

A simple hoist with cable for attaching to carts is used.

By using a number of carts, several batches can be filled at the material piles, should there be any delay at the mixer for any reason.

The "cart charger" will save several men in operating, and more rapid work will be accomplished. The saving in labor will quickly pay the entire cost of the outfit.

"The Standard" new catalogue No. 33 gives more information about the "cart charger" as well as other special and regular designs, which will save hundreds of contractors thousands of dollars before the year 1912 is over. Will you be one of them? Your name brings a catalogue. Write for it today.

THE STANDARD SCALE & SUPPLY CO.

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1345-1347 Wabash Avenue	243-245 Water Street	35 South 4th Street	136 West Broadway

When you have looked over all the advertisements in this issue of

ROCK PRODUCTS

and you still don't find what you want drop a line to

ROCK PRODUCTS

Information Bureau
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Hercules Blocks

Sell on Sight

The dense non-porous blocks of Cement Stone made on

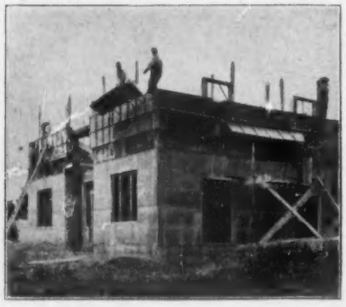
Hercules Block Machines

satisfy the eye of the most critical architect or house builder. It is one of the chief merits of the Hercules Machine that it permits blocks to be made of WET concrete. This results in greater density, greater strength and greater water proofness. The Hercules is the only machine that expands with the requirements of your business. The only machine that makes dimension stone up to Six Feet long.

The Hercules is built upon one solid frame 6 feet long. If your demand is just for an 8x8x16 block, you only need the mould box for that size. As your trade increases, you merely add new plates to be attached to your original machine. You don't have to buy a new machine every time you wish to make a different size. There are many other points connected with Hercules machines you ought to know. These are fully told in a "little book" we have just issued. Send for it today.

Century Cement Machine Co.
288-298 St. Paul St., Rochester, N. Y.

The MORRILL SYSTEM of STEEL FORMS
Reduces Cost, Eliminates Waste of Lumber and Labor



Note the "Swing Up", 30 feet (15 plates), raised in 10 minutes.

Simple—Rigid—Indestructible

Any man can put it up. Adjustable to any dimensions and any thickness.

No Bolts—No Nuts—No Wires

All wedge connection—locked and unlocked by a stroke of the hammer. Adopted on hundreds of buildings for Real Estate Companies, Railroads, and Foreign Contracts.

Makes Poured Houses Possible.
Investigate fully, it is worth your while.
Write today for Catalogue.

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Red, Brown, Buff and Black

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MORTAR COLORS

The Strongest and Most Economical in the Market.

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Our Metallic Paints and Mortar Colors are unsurpassed in strength, fineness, and body, durability, covering power and permanency of color. Write for samples and quotations.

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PERFECTION IN BLOCK MAKING

If you wish to attain this you should combine these three important features:

Wet Process, Face Down, Damp Curing.

The **PETTYJOHN INVINCIBLE** Machine does this, and is the only machine that does. Tandem Invincible makes two blocks at once. Price $65.00 and up. Single Invincible, $35.00 and up. With our **Triple Tier Racking System** green blocks can be stacked three high direct from machine with inexpensive home-made rigging. Plans and blue prints free to customers. It economizes space, reduces off-bearing distance and above all insures slow, even, damp and perfect curing and bleaching.

Write for our latest edition of **"Stone Making,"** a book of valuable data, just off the press—**FREE.**

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614 North Sixth Street. Terre Haute, Indiana.

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CLINTON, N. Y.

LARGEST AND OLDEST MANUFACTURERS OF

BRICK AND MORTAR COLORING

Be sure you get the genuine with the "Little Yellow Side-Label" on each package

Let us tell you about Side-Walk Black.

FOWLER & PAY

Brown Hydraulic Lime, Austin Hydraulic Cement, Jasper Wall Plaster, Brick, Stone

CEMENT WORKS: Austin, Minn
PLASTER MILL: Ft. Dodge, Iowa
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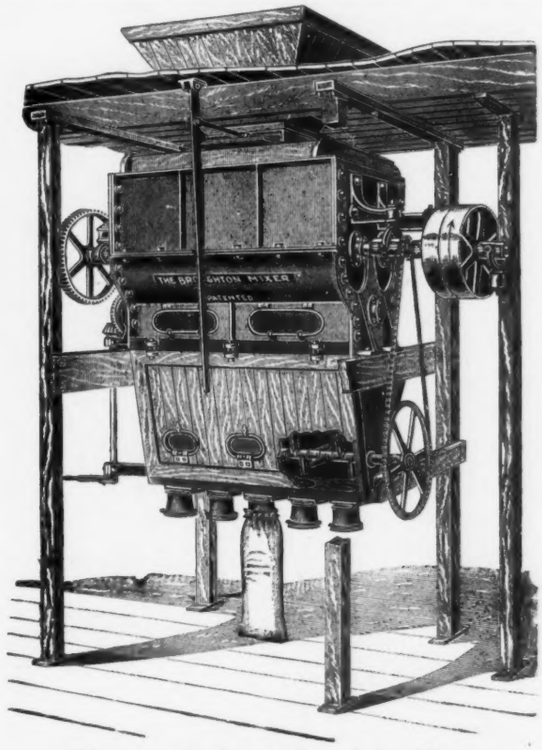
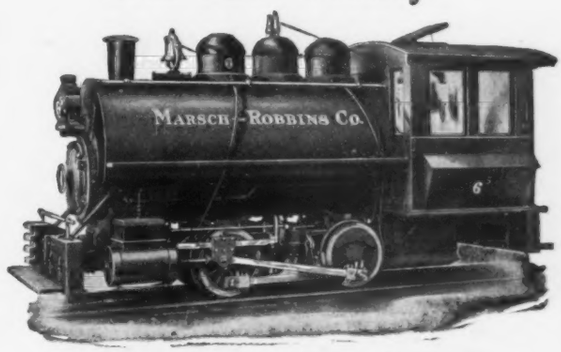


The most thorough and efficient Mixers of Plaster, Cement and Dry Materials. Send for Circular.

W. D. DUNNING, Water St., Syracuse, N.Y.

Do You Have Cars to Haul?

The Davenport Locomotive Will Save Money



Special Designs for Special Purposes, Any Size, Any Gauge, Any Weight Write for Prices and Particulars

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DAVENPORT, IOWA

BRANCH OFFICES:

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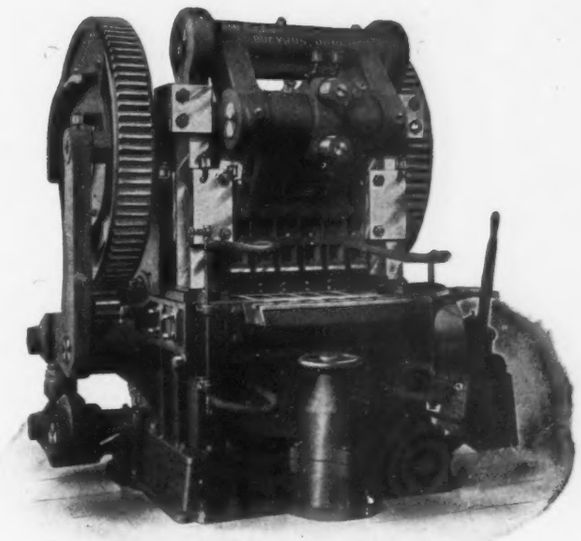
Sand-Lime Brick Machinery

OUR Sand-Lime Brick Machinery is at least a little better than any other. We have testimonials to show it. We built it all in our own factory and are sure of its quality. We are the only firm doing this. We will design and equip your entire plant or will sell you parts of your equipment. Our catalog describing and illustrating our full line will be sent upon request.

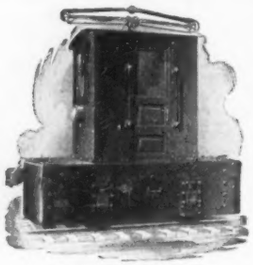
We also build a full line of machinery and appliances for making Clay Products, Cement and Pottery, Dryers, and Dryer Apparatus.

Everything we sell we make. We therefore know its quality to be right.



THE AMERICAN CLAY MACHINERY CO.

WILLOUGHBY, OHIO, U. S. A.



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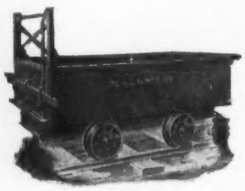
Electric Industrial Locomotive

THE ATLAS CAR & MFG. CO.

CLEVELAND, OHIO

MANUFACTURERS OF CARS FOR

QUARRIES, CEMENT WORKS AND GENERAL USES. ELECTRIC CARS AND LOCOMOTIVES, TURNTABLES, SWITCHES, FROGS.



No. 274
End Dump Quarry Car.

No. 805
Dumping Stone Carrier.

Wholesale Prices

On Anything Needed For Concrete Work

Concrete Machinery

We save you from 15 to 50 per cent on everything in the concrete machinery line. Our big facilities and big stock enable us to quote low prices and make immediate delivery. All machinery sold on guarantee with 10-day return privilege at our expense.

The Northwestern is the largest and most complete line of concrete machinery in existence. Because of enormous production and exceptional manufacturing facilities, we quote wholesale prices to everybody.

Block Machines, $10 & up
Brick Machines, $22 & up
Mixers, $24 & up
Porch Column and Baluster Outfits, $15 & up
Cap and Sill Moulds, $12 & up
Lawn Vases, $15 & up
Ball Moulds, $2 & up
Grave Stone Moulds, $7 & up
Well Curbing Moulds, $4 & up
Drain and Sewer Tile Moulds, $6 & up
Block Cars, $11 & up
Fence Post Moulds, $7 & up
Silo Moulds, $14 & up
Coping Moulds, $18
Hitching Post Moulds, $20
Baluster Moulds, $6 & up
Jardinieres, $12
Special Gate Post Moulds, $10 & up
Newel Post Moulds, $14
Grave Markers, $7
Burial Vaults, $90

Special contractor's equipment, including Culvert Forms, Drain and Tile Moulds, Rock Crushers, Cinder Crushers, Elevators, Sand Screens, all tools needed for concrete work, Block Machines of every description, special forms, wheelbarrows, gasoline engines, ornamental moulds of all kinds, etc.

Northwestern Concrete Machinery and Tools

Our Cone Batch Mixer Low intake of this mixer saves from $60 to $100 per month in labor cost alone. Mixer combines the principles of cone, cube and polygon shapes with the inside shifting and scattering of materials by paddles and scoops, adjustable for wet and dry mixes and all kinds of work. Discharging device shoots any quantity from shovel to cartload into the highest wheelbarrow or directly into moulds. All sizes from 7 ft. up—steam, gasoline or electric motor power.

Send for Catalog describing Northwestern Mixers—Sidewalk, Contractors', Block Plant Mixers, Continuous Mixers, Elevators, Hand Mixers, etc.

Northwestern Cone Batch Mixer.

Northwestern Steel & Iron Works
1062 Spring St., Eau Claire, Wis.

THERE'S A RECOGNIZED standard in every line of business,—a brand that leads in *quality* and *service*.

In cement, that brand is ATLAS.

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